

## Anatolian hemp (*Cannabis sativa* L.) cultivation, processing, and production: history and recent observations

### Cultivo, procesamiento y producción de cáñamo anatolio (*Cannabis sativa* L.): historia y observaciones recientes

### Cultivo, processamento e produção de cânhamo anatoliano (*Cannabis sativa* L.): história e observações recentes

Clarke, Robert

 Robert Clarke

rob@bioagronomics.com

BioAgronomics Group Consultants, Estados Unidos

#### Agrocienca Uruguay

Universidad de la República, Uruguay

ISSN-e: 2730-5066

Periodicity: Bilingual

vol. 27, e1166, 2023

agrocienca@fagro.edu.uy

Received: 15 February 2023

Accepted: 03 July 2023

Published: 03 October 2023

URL: <http://portal.amelica.org/ameli/journal/506/5063857018/>

DOI: <https://doi.org/10.31285/AGRO.27.1166>

Corresponding author: rob@bioagronomics.com

Agrocienca Uruguay, 2023



This work is licensed under Creative Commons Attribution 4.0 International.

**Abstract:** *Cannabis sativa* L. has been grown in Anatolia since ancient times and commercial cultivation persists on a limited scale today. Valued for its durable fiber and nutritious seed, hemp was an important subsistence crop in many rural households. Throughout the Ottoman Empire hemp cordage, fabrics and oakum were maritime necessities and internationally traded commodities. During the twentieth century commercial hemp fiber and seed production levels fluctuated due to regulatory and market forces, eventually leading to a steady decline commencing in the 1980s. Hemp production in Turkey only survives today in specialized market settings, although recently production has increased. Historical data largely gleaned from Turkish language sources is presented along with personal communications and field observations.

**Keywords:** Cannabis, hemp, Anatolia, Turkey, regulations.

**Resumen:** La *Cannabis sativa* L. ha sido cultivada en Anatolia desde la antigüedad y hoy en día persiste su cultivo comercial en una escala limitada. Valorado por su fibra resistente y sus semillas nutritivas, el cáñamo fue un cultivo importante para el sustento de muchos hogares rurales. A lo largo del Imperio otomano, los cordajes de cáñamo, tejidos y estopa eran necesidades marítimas y productos comercializados a nivel internacional. Durante el siglo XX, los niveles de producción comercial de fibra y semillas de cáñamo fluctuaron debido a fuerzas regulatorias y del mercado, lo que finalmente llevó a un declive constante a partir de la década de 1980. La producción de cáñamo en Turquía solo sobrevive hoy en entornos de mercado especializados, aunque recientemente la producción ha aumentado. Se presentan datos históricos obtenidos en gran parte de fuentes en idioma turco, junto con comunicaciones personales y observaciones de campo.

**Palabras clave:** Cannabis, cáñamo, Anatolia, Turquía, regulaciones.

**Resumo:** A *Cannabis sativa* L. tem sido cultivada na Anatolia desde tempos antigos e o cultivo comercial persiste atualmente em uma escala limitada. Valorizado por sua fibra durável e semente nutritiva, o cânhamo foi uma importante cultura de subsistência em muitas famílias rurais. Em todo

o Império Otomano, cordas de cânhamo, tecidos e estopa eram necessidades marítimas e commodities comercializadas internacionalmente. Ao longo do século XX, os níveis de produção comercial de fibra e semente de cânhamo flutuaram devido a forças regulatórias e de mercado, levando eventualmente a um declínio constante a partir da década de 1980. A produção de cânhamo na Turquia sobrevive apenas hoje em configurações de mercado especializadas, embora recentemente a produção tenha aumentado. Dados históricos em grande parte obtidos a partir de fontes em língua turca são apresentados juntamente com comunicações pessoais e observações de campo.

**Palavras-chave:** Cannabis, cânhamo, Anatólia, Turquia, regulamentações.

## 1. INTRODUCTION

Hemp (*Cannabis sativa* L.) was once grown in many parts of Anatolia for centuries within what are today the boundaries of modern Turkey, and utilized for its durable fiber, nutritious seed, and psychoactive drug content. *Cannabis* did not originate in Anatolia and varieties from other regions were likely introduced at several times for differing purposes, as indicated by its phenotypic diversity. Hemp rope was a necessity for the Ottoman Imperial Navy (*Osmanli Donanmasi*) and its production was mandated by the sultanate, and production continued well after the establishment of the Turkish Republic. During the twentieth century cannabis drug regulations and market forces impinged upon hemp fiber and seed growing. Hemp cultivation and processing never became efficiently mechanized, and fiber and seed crops are still harvested and processed by hand. Production peaked in 1980 and began to steadily decline reaching a low in 2014, beginning to increase in recent years.

## 2. MATERIALS AND METHODS

Historical research relied on published books available in libraries and private collections, peer-reviewed articles accessed via the Internet, and personal communications with area researchers. Fieldwork was undertaken from 2014 through 2019 throughout many regions of Turkey to determine the location and extent of present-day *Cannabis* cultivation for fiber and seed, and to interview local respondents involved in hemp cultivation and local governance concerning the recent history of *Cannabis*, its traditional uses and details concerning its cultivation for seed and fiber processing, as well as spinning and weaving and rope making.

---

## AUTHOR NOTES

rob@bioagronomics.com

### 3. RESULTS AND DISCUSSION

#### 3.1 Hemp terminology

The English collective noun “hemp” was originally used to describe *Cannabis* fiber and fiber products, but is commonly used as a collective noun to denote many other bast (bark) fiber plants. While this linguistic circumstance lends much confusion to the interpretation of English language references, the Turkish language is blessed with more discrete terms for hemp —*kendir* or *kenevir*— which refer only to the *Cannabis* plant and its various products. In present-day Turkey both *Cannabis* plants and hemp textiles are most commonly called *kendir*, while *kenevir* and related terms are less frequently used to denote cannabis products in general and especially drug cannabis.

Both words originated long ago within differing cultures and followed separate pathways into common Turkish usage. *Kenevir* first appears in a medical text by Hızır Paşa Müntehab-ı Şifa circa 1410 CE and its root is likely the Greek word *kanavúri* (Greek: *κανναβούρι*)<sup>(1)</sup>. *Kendir* comes from the Uyghur language and is first referenced in “The Story of Good Prince and Evil Prince” dating from circa 1000 CE. The English translation is: “Many people use the spinning wheel weaving silk, weaving wool, weaving hemp.” Uyghur is part of the Turkic language group, and *kendir* has likely been in use since the time when Turkic peoples dispersed across the Central Asian steppes into Anatolia.

#### 4. GEOGRAPHICAL SETTING AND ORIGINS OF ANATOLIAN CANNABIS

Anatolia forms the westernmost land mass of Asia, bounded by the Black Sea to the north, the Mediterranean Sea to the south, and the Aegean Sea to the west, and makes up the majority of present-day Turkey lying to the east of the Bosphorus Strait joining the Black Sea to the Mediterranean. Although Turkey is largely surrounded by water it borders present-day Georgia, Armenia, Azerbaijan, Iran, Iraq and Syria to the east, and Bulgaria and Greece across the Bosphorus to the west of Anatolia. Anatolia's complex geologic history produced a highly divided terrain consisting of a central plateau nestled between two mountain ranges that converge in the east, with lowlands limited to a few narrow coastal strips along the seacoasts. Regions with a mild continental or Mediterranean climate and flat or gently sloping arable land suitable for field agriculture are limited and include among the larger watersheds the Kızılırmak or ‘Red River’ (classical Halys), Yeşilirmak or ‘Green River’ (classical Iris), Sakarya (classical Sagrphos), Gediz (classical Hermos), Büyük and Küçük Menderes (classical Meander) river valleys where hemp was traditionally grown.

*Cannabis* populations may have reached Anatolia from three different origins and at different times. European *Cannabis* likely evolved within a glacial refuge in the Caucasus-Colchis region bordering the Black Sea coast near eastern Anatolia, and from there it diffused across much of Europe, where it was widely utilized early on for its fiber. Based on the ecological requirements of *Cannabis* for a temperate climate with summer rainfall, Anatolia may have been one of the first places *C. sativa* spread as the region's climate began to warm during the Holocene epoch commencing 12,000 years ago<sup>(2)</sup>.

Throughout the Himalayan foothills at temperate elevations *Cannabis* is grown for fiber, seed and drug production and feral plants abound. A possible avenue for the earliest dispersals of *Cannabis* may have been along a narrow corridor from an additional glacial refuge in present-day southwestern China through northern South Asia and the Arabian Peninsula to the Middle East. Centuries earlier the climate in the steppe regions of Central Asia was much as it is today and dispersal of *Cannabis* along the trade routes crossing this region from China where it has a long history as a food, fiber and medicinal plant is also likely<sup>(2)</sup>. Once in Anatolia, *Cannabis* encountered many habitats conducive to its growth and proliferation.

Human occupation of Anatolia dates back to at least the Upper Paleolithic Period. Anatolia's strategic location along the “Silk Roads” and Mediterranean littoral trade routes assured exposure to various Asian agricultural products and traditions. It is within this cultural crossroads that hemp fiber products such as cordage were made. Eastern Anatolia was a center of the Neolithic Revolution and one of the early regions of agriculture and plant and animal domestication. Indo-European languages have been spoken there for at least four thousand years and for over five millennia Anatolia has been home to a series of historically significant cultures. Continuing excavations at the large Neolithic town of Çatalhöyük occupied from 7100 to 5700 BCE uncovered a well-preserved plain weave fabric that has been interpreted as being woven of either flax (*Linum usitatissimum*)<sup>(3)(4)</sup> or possibly hemp<sup>(5)</sup>, and no conclusive analyses have been performed.

The Hittites ruled during 1600 to 1200 BCE from their capital Hattusa located in the great loop of the Kızılırmak River. This is a region where hemp rope and textiles were still commonly made in the twentieth century. The Hittites were a cultural blend of indigenous Hattian peoples with semi-nomadic Indo-European immigrants from the Central Eurasian steppes, and may have been among the peoples who introduced hemp spinning and weaving to Anatolia.

According to Berkol<sup>(6)</sup>, records of a seventh century BCE expedition by seafarers from Miletus, an ancient Greek city on the Aegean coast of Anatolia, mention that residents of the Colchis Basin region in present-day Georgia cultivated hemp and sold hemp textiles along the Black Sea coast and possibly into Persia as well. *Cannabis* was already well known to Greek and Roman cultures by the beginning of the current era<sup>(2)</sup>. In their study of Ephesus harbor, Stock and others<sup>(7)</sup> reported that sediments deposited in the harbor canal between the eighth and third centuries BCE exhibit a clear increase in *Cannabis* pollen along with several cereals probably transported in Hellenistic times from the interior hinterlands by the Ku#u#k Menderes River, and is interpreted as evidence of Roman land clearance and their introduction of cultivated plants. Hemp cultivation and processing was most likely introduced long before the Turkic migrations either directly from the nearby Caucasus-Colchis region or from Greece or Rome via trade.

Historically, Turkic peoples were nomadic herders and practiced little settled agriculture. Hemp is generally a crop of sedentary farmers, or swidden agricultural cultures such as the Hmong minority of China and northern Southeast Asia<sup>(8)(9)</sup>, and hemp cultivation is not well suited to a perpetually nomadic lifestyle. Nomadism has declined steadily for more than a century in Anatolia due to obstructions resulting from the establishment of national borders and increased settled occupation of grazing lands. As Turkic peoples settled and took up agriculture, they began to split their time between village life and seasonal pastoralism.

The Seljuk Turks must have been familiar with hemp cultivation long before they permanently settled Anatolia in the eleventh century. Agriculture was established early on in eastern Eurasia including present-day Mongolia, where the Jurchuen and Xiongnu cultural antecedents of the Turkic peoples are thought to have originated, and *Cannabis* was already likely grown by them as it was in ancient Han China and across much of the Far East. Ancient *Cannabis* pollen, fibers and seeds have been recovered from several sites in Central Asia<sup>(2)</sup> dating from well before Turkic-related peoples began their westward dispersal around 1500 years ago, and they certainly could have carried *Cannabis* seeds with them. If Turkic Central Asian peoples cultivated hemp at favored locations, or if it simply grew wild across the region where they encountered it along their way, Turkic peoples likely served as an additional vector of *Cannabis*' dispersal into Anatolia.

## 5. HISTORICAL ANATOLIAN HEMP PRODUCTION REGIONS

*Cannabis* cultivation for fiber has a long history in Turkey. Hemp ropes and woven products such as rugs, grain sacks and saddlebags were widely produced in two areas of Turkey —one in the northern central Anatolian mountains inland from the southern shore of the Black Sea northeast of Ankara, and another in

the hills of southwestern Anatolia south of Istanbul. These areas of present-day Turkey lie within the Black Sea, Central Anatolia, and Aegean regions.

Northeast of Ankara in the inland Black Sea (*Karadeniz*) region hemp cultivation and production centers were located either along the Yeşilirmak River and its tributaries flowing through parts of Amasya, Çorum, Samsun and Tokat provinces, or along the Kızılırmak River and its tributaries flowing through parts of Amasya and Kastamonu provinces. In the Central Anatolia (*Orta Anadolu Bölgesi*) region hemp was traditionally grown along the Kızılırmak River and its tributary watersheds in Sivas and Yozgat provinces, as well as along the Sakarya River in Eskişehir province. The traditional Aegean (*Ege Bölgesi*) hemp producing region includes the watersheds of the Büyük Menderes River flowing through Kütahya, Uşak, Denizli and İzmir provinces, the Sakarya River in Kütahya province, the Gediz River flowing through Kütahya and İzmir provinces, and the Küçük Menderes River in İzmir province.

## 6. ANATOLIAN CANNABIS EVOLUTIONARY ORIGINS AND GENETIC DIVERSITY

Hemp fiber has a lengthy history across temperate Eurasia, and cultures in various regions have utilized differing localized *Cannabis* landraces. The putative ancestor of all *Cannabis* likely originated in central Eurasia millions of years ago. It is hypothesized that through geographic and genetic isolation within glacial refugia it evolved into the two major taxa extant today —European *C. sativa* or narrow leaflet hemp (NLH) adopted by early humans for fiber and seed production, and the more genetically diverse Asian *C. indica*, primarily used for drug production but also utilized for its fiber and seed<sup>(2)</sup>. Hemp fiber derived from both species has a long history of textile use across temperate regions of Eurasia from far eastern China, Korea and Japan (*C. indica* broad leaflet hemp or BLH) to Western Europe (*C. sativa* narrow leaflet hemp or NLH). *C. indica* narrow leaflet drug (NLD) varieties are also used for hemp fiber and seed production in Nepal. Hemp was traditionally grown into the twenty-first century by many Tibeto-Burman tribal groups living along a narrow corridor extending from Yunnan province, China, through extreme northern Burma and across the Himalayan foothills to western Nepal<sup>(2)</sup>. All of these groups used *Cannabis* as a source of both fiber and seed. Farther west, cultural preferences and the aridity of Arabian and Persian deserts precluded hemp fiber cultivation, which does not reappear until the Anatolian region of present-day Turkey.

Economic botanist Peter Mikhailovich Zhukovsky visited Turkey in 1925 with a Russian commission. According to Zhukovsky<sup>(10)</sup>, Anatolian *Cannabis* could be divided into six ecotypes: Type I was identified from the traditional Black Sea and Aegean hemp growing regions in Samsun, Kastamonu, İzmir and Antalya provinces; Type II was identified in Adana in southern central Anatolia; Type III, a drug type, was found in Bursa across the Marmara Sea south of Istanbul; Type IV was spread throughout the traditional hemp cultivating areas of the inland Black Sea and Central Anatolian regions in Yozgat, Burdur, Isparta, Tokat, Sivas, Konya and Kayseri provinces; Type V, a wild type, was found in mountainous areas of southern central Anatolia in Kayseri, and Type VI was identified in Van, Muş, Bitlis and Erzurum in eastern Anatolia<sup>(11)</sup>.

Based on samples and data collected by the Russian commission, Type IV *Cannabis* from Kayseri and Konya exhibited the greatest diversity. The largest seeds came from the Type IV plants found in Isparta and Burdur (5.0 millimeters in length), and those with the highest oil yield were among Type IV plants from Burdur (39.8%) and Type I plants from Kastamonu (39.9%) (Zhukovsky, 1951 cited in Taşgil and Şahin<sup>(11)</sup>).

The Turkish Germ Plasm Project maintains a National Gene Bank for agricultural crops that includes 55 *Cannabis* accessions<sup>(12)</sup>. The collection summary lists Zonguldak, Kastamonu, Ordu, Amasya, Çorum, Samsun and Yozgat in the Black Sea region as hemp fiber producers, İzmir and Burdur as hemp seed producers, and Malatya and Şanlıurfa (Urfa) as producers of both hemp fiber and seed. Hemp seed accessions in their germplasm collection come from Afyon, Aksaray, Amasya, Burdur, Çorum, Diyarbakır, Erzurum,



Gaziantep, Kastamonu, Kütahya, Rize, Samsun, Şanlıurfa, Sinop, Trabzon and Van, but it is unclear whether some of these accessions (e.g., Diyarbakır and Gaziantep) may represent drug *Cannabis* varieties (see Figure 1).



FIGURE 1  
Anatolian Cannabis germplasm distribution and proposed use

Use: D = drug; S = seed; ? = unreported

Sources: 1 = Zhukovsky<sup>(10)</sup>, 2 = AARI, National Gene Bank (Access no longer granted; unreferenced)

Forensic research<sup>(13)(14)(15)</sup> identified two genetically distinct groups of *Cannabis* landrace varieties present in Turkey, lower drug types in the west and higher drug types in the east, with some overlap in the inland Black Sea region around Kastamonu. This may reflect two or more separate introductions from divergent regions at different times and for various uses, initially from the Caucasus for fiber and seed, and later from India via the Middle East for drug production.

## 7. USES OF CANNABIS IN ANATOLIA

*Cannabis* has grown in Anatolia for centuries valued for its strong durable fibers, nutritious seed, and psychoactive compounds, and it was cultivated and utilized across a large part of the region well into the twentieth century.

### 7.1 Fiber

Turkish hemp fiber processing strategies are most similar to Europe while sharing less in common with East Asia, and likely either came from Europe or were indigenously developed. (For a comparison of European and Asian hemp fiber processing strategies see Clarke<sup>(16)(17)</sup>).

Hemp rope (*kendir urgan* or *kendir halat*) was the most economically significant of Anatolia's hemp fiber products. In addition to supplying the Ottoman military with a strategic commodity, hemp cordage was a valuable export product. Until very recently hemp rope was still produced in Amasya<sup>(18)</sup>, Kastamonu and Samsun provinces. Smaller diameter hemp twine was also used domestically as well as exported.

Hemp fibers were also spun into yarns plied in pairs for use in weaving sturdy tarpaulins (*çul*), rugs (*kilim*), storage sacks (*haral*), grain sacks (*çuval*) and saddlebags (*heybe*). In Akçaşehir village of Karaman province southeast of Konya, roofs were constructed by stretching a thick hemp tarpaulin atop rough squared log

joists before soil was spread over the top, which blocked the earth from falling into the room. The thick hemp fabric was very durable and served for decades before the roof was rebuilt.

Weaving of finer hemp fabrics was rare in Anatolia, although one example is ‘Feretiko’ cloth, traditionally woven in Rize province and used for undergarments and towels. Other traditional hemp fiber products include shoes called *harik* or *resik* made in the Bitlis and Van regions<sup>(11)</sup>.

One of the most common uses of hemp fiber today is to seal threaded pipe joints, a technique used since long before Teflon tape was invented. Look under European kitchen and bathroom sinks for evidence of its enduring use. According to local hemp fiber merchants, until the recent invention of sealants impervious to organic solvents, hemp fiber was used to seal natural gas pipelines. Turet<sup>(18)</sup> mentions that tow (short hemp fibers) produced as a byproduct of rope making were collected and sold to paper mills as a pulp fiber source.

During the autumn, dried stalks were transported from hemp growing regions to neighboring urban areas and sold at the weekly market to be used as winter coverings for dirt floors. Layers of parallel stalks were laid at right angles to each other until the entire floor was covered to an even thickness of about 20 centimeters, layers of hemp tarpaulins and rugs were laid on top of the stalks, and the flooring was compressed to a thickness of around five centimeters by walking back and forth across it. Air spaces within and between the hollow stalks provided insulation from the cold winter ground. Near Konya, hemp stalks were rolled flat and woven into simple mats. In many regions the inner wood of hemp stalks remaining after peeling away the fibrous bark was used for kindling.

## 7.2 Seeds

Hemp seeds (*kendir tohumu*) are another valuable product and have likely been an item of trade across Anatolia since *Cannabis* was first grown. In addition to the annual necessity of providing sowing seed for hemp fiber and seed production, hemp seeds were pressed to express their oil in much the same way as flax, and used for cooking as well as lubrication, waterproofing cloth, and as lamp fuel. Nutritious hemp seeds rich in protein as well as *omega-3* and *omega-6* essential fatty acids<sup>(19)</sup> were traditionally eaten raw and roasted, used in porridge and often baked into breads that Turkish people recall made them feel relaxed and drowsy. Roasted hemp seeds (*cedene*) are used as an ingredient in sweet halva desserts served at ceremonial occasions<sup>(11)</sup>.

## 7.3 Hashish

It is postulated by researchers that ancient Turkic and Mongol cultures practiced “ancestral libation rituals”<sup>(20)</sup> and that, as suggested by Sherratt<sup>(21)</sup>, western steppe cultures included psychoactive cannabis in their ritual drinks. This “libation culture” may have been practiced across much of northern Eurasia from the early Jomon of Japan to the Scythian and Thracian cultures of Ukraine and Romania<sup>(2)</sup>. The favored libation of Turko-Mongol steppe peoples was fermented mare’s milk (*kumis*), in which both the fat and the alcohol could serve as solvents of tetrahydrocannabinol (THC), the primary psychoactive ingredient in *Cannabis*, allowing its easy oral administration and effective assimilation.

Turkey also has a complex history of *Cannabis* cultivation and use for hashish production; although being Arabic in origin “hashish” is not a Turkic word. High-THC drug varieties and hashish production may have come to Anatolia during the sixteenth century when water pipes (*narghile*) were introduced from India via Egypt. Turkish hashish was traditionally produced in the Ilgaz and Kuzey Anadolu Mountains both part of the Pontic Mountain range in northwestern Anatolia, the Toros Mountains of southern Anatolia, and south of Tuz Gölü or “Salt Lake” in eastern Anatolia<sup>(22)</sup>. The Fethiye region of southwestern Anatolia and

the Macedonian Balkans were sources of hashish during the Greek Rembitika music era of the 1920s and 1930s (2013 conversation with E. Polat; unreferenced).

The accumulation of sticky resin powder is a natural consequence of threshing seeds<sup>(22)</sup> and hashish was likely produced in many regions across Anatolia where *Cannabis* was grown. In Samsun and Kastamonu provinces today, male and female plants are harvested for fiber in mid-August, and for both fiber and seed in early October. Female plants are dried and threshed to remove the seeds (which also dislodges the resin glands), and it is likely that in earlier times the sticky powder rich in THC was collected and used to make hashish. Little went to waste in traditional village households, yet today, the remains of the female plants must be destroyed as stipulated by the hemp seed cultivation rules.

Illicit drug *Cannabis* cultivation in Turkey continues<sup>(23)</sup> and may be on the rise. According to police statistics 84 tons of cannabis were seized in 2014. Some cannabis drugs are imported into Turkey, but much of the supply is grown domestically. Plantations in the southeastern regions near Diyarbakır, Adana, Adiyaman, Şanlıurfa, Osmaniye and Gaziantep cultivate *Cannabis*, and “feral” growth is reportedly harvested in Kırklareli near Bulgaria<sup>(24)</sup>. Hashish is certainly the most infamous of Turkish *Cannabis* products and its fall from grace in the 1970s undermined the already shaky economic footing of hemp fiber and seed production as *Cannabis* cultivation for all uses began to decline.

## 8. HISTORICAL PRODUCTION AND USE OF CANNABIS IN ANATOLIA

The written history of Anatolian hemp production spans many decades and is best considered in two phases; the Ottoman Empire period beginning in the late thirteenth century and lasting until the establishment of the Republic of Turkey in 1922, when began the ongoing Modern period.

### 8.1 Hemp in the Ottoman Empire

*Cannabis* was likely grown for centuries on small family farms to supply domestic consumption of cordage, fabrics, and seed prior to the inception of the Ottoman Empire. During the Ottoman period hemp was grown for use by the Ottoman military, who controlled its production, taxation and transport<sup>(11)</sup> to secure supplies of fiber for making anchor ropes, rigging and lashing lines, twine, canvas sail cloth, oakum, fishing nets and other maritime uses.

The earliest records of Anatolian hemp trade date from the fourteenth century when Genoese and Venetian merchants exported raw unspun hemp from Manisa and İzmir in the Aegean region. During the fourteenth through the middle fifteenth centuries coastal Black Sea towns stretching from Sinop to Rize were centers for hemp fiber cultivation and rope making. As sea trade and warfare expanded during the sixteenth century, hemp fiber products became increasingly important strategic commodities and were in high demand (2018 conversation with S.N. Yildiz; unreferenced). Russian supplies dominated the hemp trade in northern Europe, where from late eighteenth through the early twentieth centuries England, France and Spain fought wars over rights to the strategic trade<sup>(25)</sup>. The Ottoman Empire controlled its own supplies of hemp as well as timber, pitch and iron from within its vast territories, and by the mid-sixteenth century had eclipsed Venetian naval and trade domination of the Mediterranean. As Ottoman Imperial Navy (*Osmanli Donanmasi*) power and influence grew, domestic hemp production came under the control of the Ottoman state to assure a predictable and plentiful supply satisfied by taxation in kind, with every hemp producing region collecting fiber from farmers to stock their storehouses (2018 conversation with S.N. Yildiz; unreferenced).

During the reign of Suleiman the Magnificent (1520-1566) Kastamonu was an important producer to fulfill the needs of the navy and a hemp commission was established in neighboring Samsun<sup>(11)</sup>. Sixteenth



century Ottoman records also mention taxation of hemp in the villages of the Adala Plain along the Gediz River. Ayasuluğ (present-day Ayasuluk), Tire, Ödemiş, Birgi and Bodamiya (present-day Bademli) near İzmir produced raw hemp as well as high-quality yarn and rope, and Tire became renowned for its hemp yarn and rope production. The inland Black Sea cities of Kastamonu, Yozgat, Tokat, Niksar and Amasya in the Yeşilirmak River basin also produced large amounts of hemp. Depots were set up in Kastamonu, Taşköprü and Germeç for storage and trade in hemp fiber and its products between inland and coastal regions (2018 conversation with S.N. Yildiz; unreferenced).

Eventually, the eastern Black Sea region within easy contact by sea from Istanbul became the center of Ottoman hemp production, and as shipyards were established along the eastern Black Sea coastline, farmers increasingly satisfied their tax obligations by supplying hemp fiber to the state under a fixed price system (2018 conversation with S.N. Yildiz; unreferenced). Since the early eighteenth century, Trabzon and Rize<sup>(26)</sup> and the Ordu, Canik (present-day Samsun), Zonguldak and Kastamonu regions near the Black Sea coast, as well as Aydın and İzmir along the Aegean coast and Urfa (present-day Şanlıurfa) in southeastern Anatolia were the predominant producers<sup>(27)</sup>. Throughout the eighteenth century Ödemiş near İzmir remained an important production center where hemp cultivation constituted approximately one quarter of crop production<sup>(11)</sup>.

Cloth manufactured in and around Rize supplied local needs and was also exported to various parts of the Ottoman Empire. The Armenian traveler Bijişkyan visited Rize in 1817 and observed that *Cannabis* cultivation was common everywhere. During the eighteenth century “Feretiko” hemp cloth became a major export commodity and peak production reached approximately 100,000 to 150,000 hemp fabric rolls annually<sup>(26)</sup>. The nineteenth century Janissary corps, members of the palace and even the Ottoman Sultans wore clothes and underwear sewn from this fabric. Shirts and dresses of hemp linen fabric are cooling to wear and were desired by people living in hot climates. A significant amount of hemp linen was exported to Iraq, Syria, Saudi Arabia, Egypt and Yemen. Production and sales were taxed, and trade remained strong until the mid-nineteenth century<sup>(26)</sup>.

The Ottoman state preserved its monopoly on hemp trade well into the nineteenth century by establishing exclusive lifelong procurement contracts with powerful families. Hemp was so vitally important that hemp farmers were exempted from military service. British reports from 1841 estimated that hemp production from the Samsun region alone amounted to about 1000 tons annually (2018 conversation with S.N. Yildiz; unreferenced). Mid-nineteenth century Ottoman government needs were largely met by merchants in the Trabzon, Samsun and Ordu regions along the Black Sea coast. However, problems arose with collecting the mandated hemp supplies, because merchants in Aydın and İzmir diverted production deemed essential to the Ottoman government into foreign trade. The government enforced their edicts through favored concessions and tax exemptions combined with threats to local governors, as well as fines and even prison sentences levied against non-compliant suppliers.

During the nineteenth century hemp was also exported to other nations<sup>(27)</sup> and both the inland Aegean and Black Sea regions produced high-quality yarns and ropes (2018 conversation with S.N. Yildiz; unreferenced). Foreign companies also petitioned the government to lease land and build facilities to produce hemp fiber for export, but these requests were largely disregarded by the Ottoman government<sup>(27)</sup>. During the late nineteenth century cotton began to compete for market share and hemp cloth production diminished. Several times during the first decade of the twentieth century local officials petitioned the government for tax and import levy exemptions to promote the hemp industry, as well as funds to upgrade storage facilities in need of repair and maintenance<sup>(27)</sup>.

## 8.2 Hemp production in the Turkish Republic

Hemp production declined following the First World War (1914-1921). During the early years of the Turkish Republic the new government investigated the modernization of hemp production, and financing was approved to establish the Kastamonu Kendir Rehabilitation and Export Company. However, in 1924 and 1926 Kastamonu officials again petitioned the Turkish government to establish a factory, without a positive response, and apparently the factory was never built<sup>(27)</sup>.

In the 1930s, the inland Black Sea region areas surrounding Kastamonu, Taşköprü, Daday, Çankırı and Çorum were the primary centers of production, as well as scattered farms closer to the coast in Samsun, Ordu and Zonguldak provinces, followed by Tire, Ödemiş and Aydın in the Aegean region, Balıkesir and Bursa near the Marmara Sea, and Urfa (present-day Şanlıurfa) province in the southeast<sup>(27)</sup>. In 1931, the Turkish government again committed to supporting hemp processing in Kastamonu and also sought assistance from foreign experts. In 1932, a Russian commission suggested Tire, Ödemiş and Bayındır in İzmir province in the Aegean region as sites for establishing factories for weaving grain sacks. In 1935, the Ministry of Agriculture brought another commission of experts from Germany to visit Kastamonu as well as Tire, Ödemiş and Bursa in the Aegean region, and Antalya and Mersin along the Mediterranean coast to investigate the potential for the production of both hemp and flax fiber. Their conclusion was that Turkey lacked processing infrastructure and that the inadequate retting ponds produced fiber of unpredictable quality<sup>(27)</sup>.

In 1933, the Kendirve Linen Sanayii Türk Anonim Şirketi factory was established in Kastamonu to process hemp fiber grown nearby. In 1937, the Ministry of Agriculture again discussed efforts to increase hemp production and sent a representative to the factory. By 1938, approximately 40,000 hectares of land in Turkey were devoted to hemp fiber and seed cultivation. Although fiber quality was by then relatively high, without modern infrastructure Turkey found it difficult to compete internationally with countries such as Russia and Italy, and Turkey ranked tenth in production of hemp fiber<sup>(27)</sup>. The Kendir and Linen Industry factory in Istanbul's Anatolian Castle (*Anadolu Hisarı*) was also established in 1933, and with long carding facilities manufactured high-quality rope as well as fine twine used by shoemakers<sup>(6)</sup>.

In 1939, the government again highlighted the need to establish infrastructure to support hemp production. The Ministry of Agriculture's suggestions included establishing large retting ponds, mechanizing the peeling of hemp bark, and increasing worker's wages. At this time annual production in Kastamonu was around 3000 tons; Taşköprü, Tire and Ödemiş each produced about 1000 tons; Gümüşhacıköy in Amasya province accounted for 500 tons; along with lesser production in Urfa, Isparta, Edirne and Bursa<sup>(27)</sup>.

Tea production began in Rize and Trabzon provinces around 1940 and a coarser cloth was woven to make tea sacks. In Rize province nearly 2000 looms were still operational in 1941<sup>(26)</sup>. According to 1945 statistics 40 tons of hemp were produced in the province<sup>(6)</sup>, and in 1947 a shipment of 15 tons of "Feretiko" fabric was sent to Syria for export to the Saudi Kingdom<sup>(26)</sup>. In Rize and Trabzon by the 1950s cotton was woven on an estimated 10,000 looms<sup>(26)</sup>, and soon with the spread of tea growing, hemp cultivation was almost completely abandoned<sup>(6)</sup>.

After thirty years of government promises, with the backing of Sümerbank (a Turkish bank and industrial holding company established in 1933) construction of the Kastamonu primary processing factory began in 1942, and due to additional delays caused by the Second World War, it was completed in 1947<sup>(27)</sup>. Another retting and primary processing facility was established in Taşköprü in 1946 and in 1949 the Kendir Twine and Cross Stitch Factory opened employing 250 workers, and Taşköprü hemp products were displayed at the Sümerbank pavilion during the 1949 İzmir International Fair. By 1956, this factory operated 762 spindles and 60 looms, and produced 133 metric tons of twine and 2,554,410 meters of cloth<sup>(6)</sup>. The factory eventually switched to spinning and weaving jute imported from India and remained in operation until 2004<sup>(11)</sup>.

In 1970, the Gümüşhacıköy Twine and Rope Small Art Cooperative was established leading to the construction of the Gümüşhacıköy Hemp Factory in 1984, with a capacity to spin 1000 tons of hemp twine annually. It was privatized in 1986 and eventually closed due to the failure of maintaining its Italian spinning equipment<sup>(11)</sup>.

In the Gümüşhacıköy region of Amasya province hemp has also been grown for centuries, and in 2000 nearly 2500 hectares (6000 acres) of hemp were reportedly grown for making rope and harvesting hemp seed<sup>(18)</sup>. This area was amongst the last in Turkey where hemp was grown, but within a few years of Turet's visit cultivation had all but ceased. Until recently nearby Samsun province's agricultural economy included hemp cultivation and processing. In 2000, about 400 hectares (1000 acres) of hemp were grown around Veziroköprü, but by 2015 only four hectares (10 acres) remained in production. Since 2015, new markets for hemp have rekindled increased production in Samsun, and hemp is also cultivated once again in Kastamonu province.

## 9. HEMP CULTIVATION AND PROCESSING

Anatolian hemp crops are grown and processed in much the same way as in other regions worldwide. Certain climatic and agronomic parameters must be met to produce hemp fiber suitable for spinning yarn, laying rope and/or weaving cloth —a temperate latitude with long summer day length, a climate with consistent and frequent spring and summer rain, and fertile well-drained soils to support high crop density and rapid growth rate. Historical Turkish hemp producing regions share either a warm continental or Mediterranean climate; and a rainy March and April (perfect for germination and early canopy establishment) with steadily decreasing summer rains (enough to maintain stalk growth) through the driest month of August (when harvesting and drying the stalks are facilitated by dry weather). Hemp crops may be irrigated when rainfall proves insufficient. Where hemp is grown in the inland Aegean region, elevations range from 500 to 1200 meters (1600 to 3900 feet), and in the inland Black Sea and Central regions range from 500 to 1600 meters (1600 to 5200 feet).

Turet<sup>(18)</sup> described the growing of hemp for making rope in the Gümüşhacıköy district of Amasya province, which was essentially the same way hemp is cultivated in neighboring Kastamonu and Samsun provinces today. Fields are preconditioned by plowing in manure and compost, and when the supply of organic nutrients is insufficient supplemental nitrogen fertilizer may be added. Seeds from the previous year's harvest are broadcast sown in early March, and enough soil is raked over to cover them. Sowing rates result in a final crop density ranging from 35 to 100 plants per square meter. Hemp crops must be sown at high density, so young plants are closely spaced forcing the stalks to compete for sunlight and elongate rapidly while suppressing lateral branching, promoting long fiber growth and facilitating easy handling during harvest and processing. Developing hemp crops form a tight canopy of leaves that shade the soil below and inhibit weed growth. Plants begin to flower in July when sexually mature and the stalks cease to elongate —male plants develop short panicles of pollen-producing staminate flowers and female plants develop a single long raceme of pistillate seed-producing flowers. Fiber crops reach a height of two to five meters and are harvested in early to middle August after the male plants begin to shed their pollen, and before the female plants set seed. For finer textile production in the Rize region crops were sown later and harvested earlier when plants reached only two meters in height<sup>(26)</sup>.

Hemp crops are harvested by hand as they have been for centuries —most commonly by pulling the plants out with the roots (*yolmak* or plucking), or less often by cutting them with a sickle near soil level. Fields may be irrigated a few days before harvest to facilitate pulling the plants. Three harvest strategies are used in Turkey with varying outcomes. Male and female plants are harvested together in mid-August at peak ripeness, but before seed set, which produces the most uniform fiber yield. Male plants senesce and die in

late August and early September after they have released their pollen. Sometimes male plants are harvested at maturity in August for finer fiber production and the female plants are harvested for seed and rougher fiber in October<sup>(11)</sup>. During the October harvest male stalks are separated and retted separately from the female plants that will be dried in the field, threshed of their seeds, and retted last. Seed plants yield a coarser bark with fiber that is used for spinning heavy twine and laying ropes. Both finer and coarser fibers were once utilized throughout Anatolia to spin yarns and weave fabrics for rugs, sacks, saddlebags and other domestic textiles of widely varying color, texture, and aesthetic character.

No matter which fiber harvest strategy is followed, whole plants are laid parallel to each other on the field in single layers and left in the sun for three to five days to partially dry before the stalks (*çubuk kendir* or hemp sticks) are threshed of any remaining flowers and leaves by holding eight to twelve together near the roots and slapping them repeatedly against the ground. Then they are spread out on the field again for a few more days to continue drying and bleaching in the sun, before being collected and tied into bundles of fifteen to thirty stalks (depending on their diameters) and propped together in upright conical stooks to further dry before transport to the retting ponds. Stalks that will be retted later are protected from rain, so they do not become discolored by fungal growth.

Retting (*ıslatıp yumuşatmak* or wet softening) is a process that partially rots the soft connective stem tissues to free the fiber-rich bark from the woody core. The bundles of dried stalks are retted in water (*havuzlama, kendir havuzlaması* or hemp pooling) by placing them in a stone-lined pond or concrete basin (*gölleme* or lake) filled from a nearby stream and covered over with large stones (called *taşlama* or stoning) to keep the light bundles from floating. Retting (*olgunlaştırma* or ripening) may take from as short as three days to a week in warm water, to two to three weeks or longer in cool or cold water. Timing of the ret is a crucial step in the progress toward spinning hemp yarn —too quick and the bark is difficult to peel from the stalk, too slow and the fibers are weakened—, and when performed correctly yields soft and strong fibers perfect for spinning<sup>(11)(18)</sup>. Stalks are less commonly field retted (*arazi havuzlaması* or land pooling) alternately wetted by rain and dew and dried by the sun for one to three months<sup>(6)</sup> although this produces lower quality fiber<sup>(11)</sup> of a greyish color.

Once bundles of hemp stalks are sufficiently water retted, they are returned to the field and organized in stooks to dry a second time in the sun and wind. Stalks destined for spinning and weaving may be processed a few at a time by repeatedly crushing them along their full length in a wooden hemp breaker (*kopali*) to release the fibrous bark (*lif, uskuli, .unci*) from the inner woody core (*kecin, kunci*) and then scutched by placing the bark strips across an anvil, such as a wooden stump or wagon wheel, and repeatedly hitting them with a wooden scutching knife (*kofte* or *keski*) to remove any remaining small bits of wood called shives or hurds (*havaz*)<sup>(6)</sup>. However, when stalks are processed for making rope, farmers manually strip away the dry bark beginning at the bottom of each stalk<sup>(18)</sup>, much like in the East Asian fiber extraction process<sup>(16)(17)</sup>. The sections of inner wood (*kecin, kunci*) are used around the home as fuel for kindling and baking hand-made bread<sup>(18)</sup>. In earlier times water-powered beating mills (*kaldıraç, ling*) were located next to streams and used to soften the fibrous bark strips by repeatedly beating them upon a flat rock with a rising and falling wooden mallet<sup>(6)(26)</sup>.

Hanks of parallel bark strips are further processed by pulling them from base to tip through a hackle (*mengenez* or vice, *kendirteragi* or hemp comb, *demirtarak* or iron crown) to remove small bits of wood and shorter fibers and split the bark into narrower strips. The hackle is essentially a wooden board with evenly and closely spaced long iron nails driven through it like teeth in a three-dimensional comb. If the fibers are intended for spinning finer yarn, they are further processed through a series of three hackles with narrow iron teeth spaced closer together to obtain finer and softer fiber bundles (*tarama*). Following this process long fiber yields range from 15-18 percent of the dry stalk weight<sup>(11)</sup>.

## 10. CANNABIS PRODUCTION STATISTICS

The twentieth century was a time of great economic and political changes that impacted Turkish hemp production, and those conditions are reflected in production statistics. Turkish cultivation statistics reported by several sources provide considerable insight into the vacillating levels of *Cannabis* cultivation for fiber, seed and drug production since the early twentieth century. Turkish researchers were the first to monitor domestic production<sup>(28)(29)(30)(31)(32)(33)</sup>, and in 1961 the Food and Agriculture Organization of the United Nations<sup>(34)</sup> began to compile statistics. Recent cannabis drug seizure statistics are provided by Turkish police to international monitoring agencies<sup>(24)(35)</sup>.

### 10.1 Hemp fiber and seed production

Annual hemp fiber and seed production statistics provide data useful in determining the fluctuations in cultivation levels both for Turkey as a whole and for individual provinces. Kastamonu province was Turkey’s largest producer of hemp fiber during the early twentieth century with yields ranging from a high of 5000 metric tons in 1914 to a low of 1900 tons in 1924, and averaging 2680 tons per annum (see Figure 2).

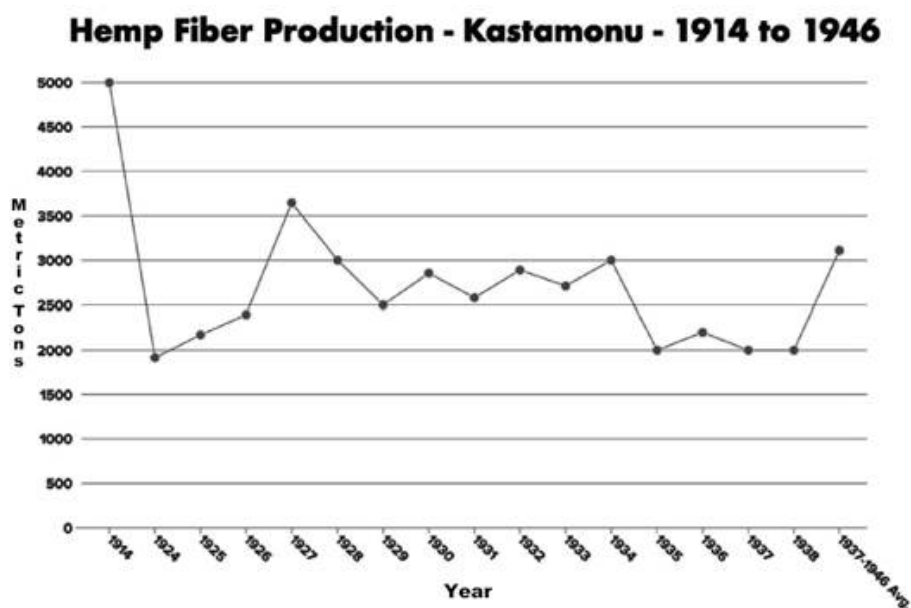


FIGURE 2

Annual hemp fiber production (metric tons) in Kastamonu province, Turkey – 1914 to 1946<sup>(28)</sup>

Turkish annual hemp fiber production from 1961 through 2018 ranged from a high of 14,000 metric tons in 1980 to only one ton in 2013 and 2014 (see Figure 3). Fiber yields from 1961 through 2018 ranged from 450 to 1500 kilograms per hectare with an average yield of 1320 kilograms per hectare.



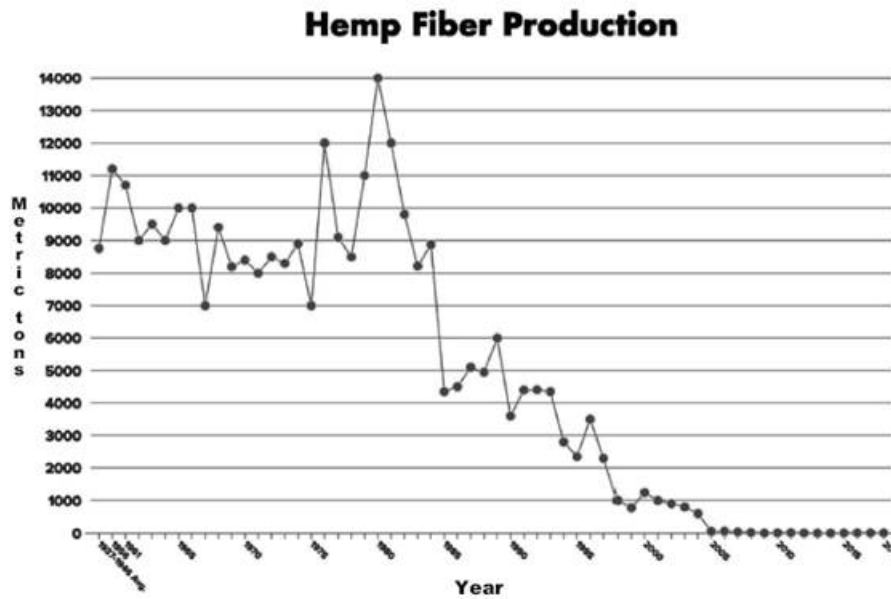


FIGURE 3

Turkish hemp fiber production (metric tons) – 1937 to 2018<sup>(29)(30)(31)(32)(34)</sup>

Hemp seed production steadily declined from 5,900 tons in 1962 to only one ton in 2013 through 2016 (see Figure 4). Hemp seed yields varied widely from 76 to 730 kg/ha, with an average of 336 kilograms per hectare.

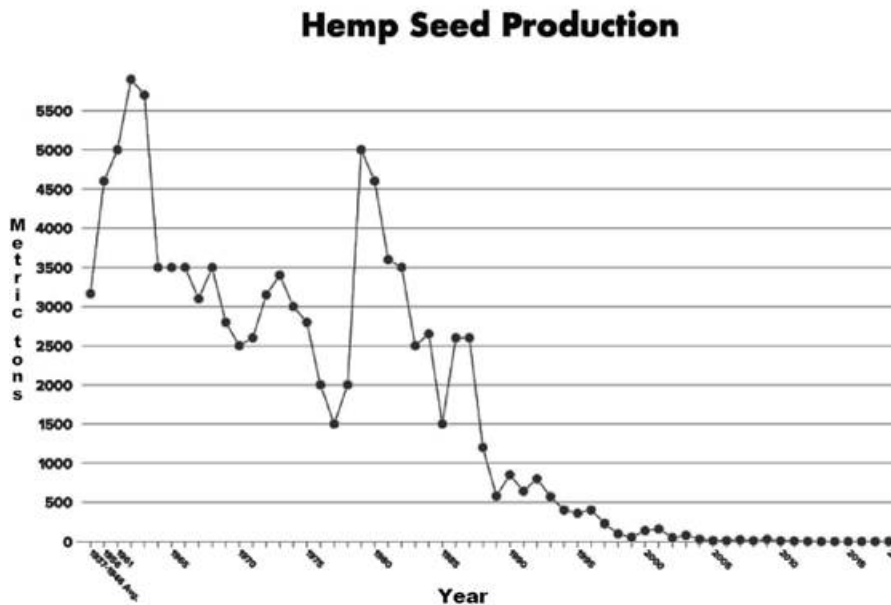


FIGURE 4

Turkish hemp seed production (metric tons) – 1937 to 2018<sup>(29)(30)(32)(34)</sup>

Note: Data from 2013 and 2014 were deleted as spurious.

## 10.2 Cannabis drug seizures

Since 2007, Turkey has seized larger quantities of cannabis drugs annually than any country in the European Union. In Turkey's southeastern province of Diyarbakır 46,234 kilograms of herbal cannabis and 84,740 kilograms of cannabis resin was seized in 2013, accounting for 25.67% and 89.88%, respectively, of the total cannabis drugs seized that year<sup>(24)</sup>. In 2017, in all of Turkey 94,379 kilograms of herbal cannabis and 81,429 kilograms of cannabis resin were confiscated. The potency (percent THC) of the herbal cannabis ranged from 0.02 to 20.53% dry weight and the potency of the cannabis resin ranged from 0.02 to 32.94%<sup>(35)</sup>.

Turkey is a transshipment point for cannabis drugs, and seizure statistics do not indicate domestic Turkish production alone, although *Cannabis* is certainly grown in Turkey for drug production today to satisfy both local market and export demands. The Hürriyet Daily News reported on June 22, 2020, that more than seven million *Cannabis* plants were seized from more than 80 farms in Diyarbakır province<sup>(23)</sup>, and both cannabis drug production and seizures have increased in recent years<sup>(35)</sup>.

## 11. CANNABIS PRODUCTION REGULATIONS

The League of Nations founded in 1920 created an international body to address issues of drug control. In 1931, the Geneva Convention drafted the International Convention of Limiting the Distribution of Narcotic Drugs. Turkey joined the League of Nations in 1932 and ratified the 1931 convention, and in 1933 established the first Turkish drug laws. The League of Nations functioned in this regard until 1946 when its international responsibilities were transferred to the United Nations, of which Turkey was an original member.

Turkey joined the 1961 United Nations Single Convention on Narcotic Drugs (UNSCND) in 1967 and ratified it in 2001<sup>(36)</sup>. The UNSCND places restrictions on illicit drug production and requires each signatory nation to establish an agency to control Cannabis cultivation. Article 28 of the UNSCND states that: "This Convention shall not apply to the cultivation of the *Cannabis* plant exclusively for industrial purposes (fiber and seed) or horticultural purposes." In practice, many signatory governments simply prohibit the cultivation of all *Cannabis* and may (or may not) elect to license hemp fiber and seed farmers as Turkey does.

Article 3 of the 1933 Turkish drug laws states that it is illegal to farm the plant ("*Cannabis Indica*") used exclusively for producing hashish (*esrar*), and that in any circumstance it is illegal to prepare, import, export and sell hashish; and Article 23 states that wherever *Cannabis Indica* plants are found they must be destroyed, and that persons found in violation of the law will be given a prison sentence of one to six months. The wording of the laws makes it clear that the intention was to prohibit hashish drug production while allowing hemp fiber and seed cultivation.

In 1979, Article 3 of the 1933 law was amended to change "Cannabis" (*hint kenevir*) to simply "hemp" (*kenevir*), and Article 23 was also amended such that hemp could not be grown without permission of the Ministry of Food, Agriculture and Livestock. It was also mandated that the Gendarmerie should budget time for the destruction of unlicensed crops, and that farmers should bear the expenses of destruction.

In 1990, Article 23 was further amended to transfer the responsibility for granting permissions for hemp cultivation to the Ministry of Agriculture, Forestry and Rural Affairs, who defined "hemp" as plants belonging to genus *Cannabis*, fiber and wood raw materials derived from the stalks, and seeds used for any purpose. Based on traditional areas of hemp production, cultivation for fiber, seed or both purposes was allowed in 20 provinces located in the inland Black Sea (Amasya, Çorum, Tokat and Yozgat), coastal Black Sea (Bartın, Karabük, Kastamonu, Ordu, Rize, Samsun, Sinop and Zonguldak), inland Aegean (Burdur, Kütahya and Uşak), coastal Aegean (İzmir and Antalya), Central Anatolia (Kayseri) and Eastern Anatolia (Malatya and Şanlıurfa) regions. However, some traditional hemp producing provinces were omitted, such

as Artvin, Gümüşhane and Trabzon in the Black Sea region, and Eskişehir, Afyon, Denizli, Gediz, Isparta and Nevşehir in the Aegean region (see Figure 5).



FIGURE 5

Traditional hemp-producing regions in Turkey Provinces where hemp cultivation for fiber and seed are presently allowed are indicated in green Provinces where hemp was traditionally grown but cultivation is no longer allowed are indicated in red Kastamonu and Samsun provinces were the only remaining regions of hemp fiber production in 2020

In 2011, the rules were further amended to establish guidelines for scientific research and hemp breeding, as well as adding guidelines for hemp field inspections and control measures including an application form for farmers to provide their personal information and the locations of their fields. In 2014, penalties for cannabis drug production were increased and farmers found guilty were to be given a prison sentence of 4 to 12 years, and in 2016 Şanlıurfa was removed from the list of approved provinces because of cannabis drug production. Throughout these changes hemp fiber and seed production remained legal in the remaining approved provinces.

Presently, Turkish laws only forbid *Cannabis* cultivation for drug production, and do not apply to hemp cultivation for fiber and seed in approved provinces<sup>(26)</sup>. Presently *Cannabis* cultivation is prohibited for any purpose except in the 19 approved provinces and allowed growing areas are determined at the provincial level by the Ministry of Agricultural and Rural Affairs (MARA). All farmers must receive permission to sow hemp seeds, and if farmers grow without permission they are penalized, although applying for a license to grow hemp is merely a formality and approval can be easily achieved. All hemp growing areas are regularly controlled by MARA from sowing to harvest as per their regulations.

Hemp fiber and seed crops are almost entirely sown from traditional landrace seed saved by the farmers from the previous year's harvest. There is no list of approved hemp cultivars and no allowable THC percentage as in the European Union, although MARA also controls hemp seed imports.

Farmers process their own hemp fiber and seed crops. There are no environmental programs, producers' organizations, or income supports, and no central registration system for processors or controls in terms of quantity and quality. There is no distinction for long and short fibers. According to Turkish Standard 3911 of 1983<sup>(37)</sup>, hemp fibers should be uniform in color and clean of foreign materials with moisture content below 12 percent, but it is not obligatory to follow these standards.

## 12. IMPACT OF DRUG LAWS ON TURKISH HEMP PRODUCTION

The possible effects of drug laws on Turkish hemp production can be further understood in the context of international hemp production statistics for other countries. According to the Food and Agriculture Organization of the United Nations<sup>(34)</sup>, during the 1970s, China's hemp fiber production rose and fell with a peak of 97,000 tons in 1973 followed by a long decline that bottomed out in 1999 at 13,200 tons. A steady resurgence brought Chinese production levels to a high of 82,900 tons in 2006 when production again declined reaching the lowest level of 10,900 tons in 2010, with 12,623 tons produced in 2018. The Soviet Union posted its largest production figures of 114,000 tons in 1966 but by 1991 production had dropped to 14,000 tons. Production in the Russian Federation was 11,600 tons in 1992 declining to a low of 1214 tons in 2014, with 1256 tons produced in 2018. The smaller Carpathian and Baltic states each passed through their own fluctuations in production. Bulgaria, Czechoslovakia, Hungary, and Yugoslavia reached peak hemp fiber production between 1965 and 1967, and production has dropped steadily ever since.

Although hemp fiber production in Turkey was also high in 1965 and 1966 at 10,000 tons, peak production came much later in 1980 when 14,000 tons were produced and exceeded all other nations in Europe (except for the Soviet Union), and production remained strong for a few years before its steady decline to one ton in 2014. There has been a small resurgence in hemp fiber production since 2015 with three tons, and in 2016, 2017 and 2018 production reached nine tons. Hemp seed production was highest at 5900 tons in 1962 dropping to one ton in 2013 through 2017, and rising again to three tons in 2018<sup>(34)</sup>.

Although hemp cultivation without government permission has been prohibited in all Turkey since 1979, it is unclear when and how between 1933 and 1979 this permission/license structure was established and how extensively it was enforced. However, since hemp fiber and seed crops continued to be farmed in large quantities during these years, we can assume that either it was not difficult to receive permission, or the regulations were largely disregarded. Possibly permission was de facto granted when farmers reported what crops they intended to grow the following year and hemp cultivation was included in that procedure.

Since the laws prohibiting *Cannabis* cultivation for drug production were first enacted, law enforcement officials used them to levy penalties against hemp farmers, further discouraging them to continue cultivation for fiber and seed. During this time the regulations were not widely understood by rural farmers and there was often confusion about whether hemp cultivation was legal or not. Hemp farming likely ceased more slowly in some regions than others, but hemp production eventually shrank to near nothing during the 1980s, before 1990, when cultivation for non-drug purposes was permitted in the 19 listed provinces. Remaining stocks of fiber, yarn, twine, and rope were utilized for many years after cultivation ceased, although by the early 1990s most hemp supplies were exhausted.

How strongly did enactment of the UNSCND in 1967 influence hemp production in Turkey? Production statistics indicate that hemp fiber and seed production began to decline in the late 1960s well before enactment of the amended hemp laws in 1979. Yet fiber hemp production remained strong during the 1970s and peaked in 1980. Production statistics reveal that hemp fiber production also declined during the 1970s in many other countries such as China and the Soviet Union, with no traditional drug cannabis production, so other factors may have been of greater impact than the United Nations treaty. Hemp's worldwide decline is more easily explained by strong market competition from mass-produced, widely available and inexpensive petrochemical-based tarpaulins and sacks, and the increased importation of lower priced "tropical" fiber (e.g., sisal *Agave sisalana* and jute *Corchorus* spp.) products that replaced hemp rope, twine and grain sacks.

It appears that in Turkey adherence to the UNSCND and establishment of local laws slowly began to curtail cannabis drug production without seriously impacting hemp production. Competition from artificial fibers slowly suffocated hemp production, and by 1990, when more accessible hemp cultivation controls were enacted, it was already too late to revitalize Turkish hemp production. After 30 years of confusing

drug prohibition legislation and decreasing earnings, farmers simply realized that their hard work resulted in too little profit, and even a simplified licensing system likely served as more of an additional deterrent than increasing incentive to continued *Cannabis* cultivation.

### 13. CONCLUSIONS – HISTORY, PRESENT SITUATION, AND PROSPECTS

To the north and west from Anatolia throughout temperate Eastern and Western Europe extends an ancient continuum of hemp textile traditions based on cultivation. Turkic peoples may have brought *Cannabis* varieties to Anatolia for specific favored uses, but they were likely not the first. Certainly, once in Anatolia settled Turkic peoples cultivated *Cannabis* to satisfy their specific needs for food, textiles, and drugs.

*Cannabis* hemp has a long history of cultivation in Anatolia from early times until the present. Hemp fiber was a strategic commodity for the Ottoman navy used for rigging and sails, and the sultanate ensured its supply through various means. Hemp fiber was also used domestically for spinning cordage and weaving heavy fabrics. Hashish production was forbidden in 1933, and continuing confusion concerning the legal status of hemp combined with international competition from other natural fibers (as well as synthetic) led to a decrease in production. Commercial production and export continued during the early decades of the twentieth century but began to steadily decline following the 1970s. Hemp seed cultivation largely for birdseed also declined during this period. Efforts by the Turkish government to revitalize the industry were only temporarily successful and production nearly ceased by the early twenty-first century. In recent years production has increased as newly emerging entrepreneurial markets for hemp fiber and seed begin to appear.

### ACKNOWLEDGMENTS

Emir Polat is the Director of Kendir Bouquet Handwoven Textiles and Ropes Ltd. based in Vancouver, British Columbia, Canada, and produces hemp fiber and seed in Turkey by traditional means. Emir supported fieldwork in 2017 through 2019, provided translations of Turkish language references, and offered a helpful overview of Turkish cultural history. Sara Nur Yildiz studies Medieval Anatolia, Ottoman History, and Medieval Islam, and shared details of hemp trade and taxation gleaned from Ottoman historical records. Special thanks to Recep Eşler for providing several recent Turkish language references.

### REFERENCES

1. Nişanyan S. The etymological dictionary of Turkish [Internet]. [place unknown]: Sevan Nişanyan; 2002-2023 [cited 2023 Aug 02]. Available from: <http://www.nisanyansozluk.com/>
2. Clarke RC, Merlin MD. Cannabis: evolution and ethnobotany. Berkeley: University of California; 2013. 456p.
3. Hodder I. 2013 season review. Çatal News [Internet]. 2013 [cited 2023 Aug 02];(20):1. Available from: <https://bit.ly/47iwLzw>
4. Fuller DQ, Bogaard A, Charles M, Filipović D. Macro- and Micro-botanical remains from the 2013 and 2014 seasons. In: Haddow SD, editor. Çatalhöyük 2014 Archive Report [Internet]. [place unknown]: Çatalhöyük Research Project; 2014 [cited 2023 Aug 02]. pp. 118-29. Available from: [http://www.catalhoyuk.com/sites/default/files/media/pdf/Archive\\_Report\\_2014\\_0.pdf](http://www.catalhoyuk.com/sites/default/files/media/pdf/Archive_Report_2014_0.pdf)
5. Holloway A. First hemp-woven fabric in the World found wrapped around baby in 9,000-year-old house. Ancient Origins [Internet]. 2014 Feb 06 [cited 2023 Aug 02]. Available from: <https://bit.ly/3YkhEBo>
6. Berkol C. Double weaving from past to present in Anatolia [master's thesis]. Istanbul (TR): Marmara University, Institute of Fine Arts; 2008. 163p.



7. Stock F, Knipping M, Pint A, Ladsta#tter S, Delile H, Heiss AG, Laermanns H, Mitchell PD, Ployer R, Steskal M, Thanheiser U, Urz R, Wennrich V, Bru#ckner H. Human impact on Holocene sediment dynamics in the Eastern Mediterranean: the example of the Roman harbour of Ephesus. *Earth Surf Process Landf*. 2016;41(7):980-96. Doi: 10.1002/esp.3914.
8. Clarke RC, Gu W. Survey of hemp (*Cannabis sativa L.*) use by the Hmong (Miao) of the China/Vietnam border region. *JiHA* [Internet]. 1998 [cited 2023 Aug 02];5(1). Available from: <https://www.druglibrary.org/olsen/hemp/iha/jiha5101.html>
9. Clarke RC. Hmong hemp skirts. *J Ind Hemp*. 2005;10(1):61-85. Doi: 10.1300/J237v10n01\_06.
10. Zhukovsky PM. Türkiye'nin Zirai Bünyesi (Anadolu) [Turkey's Agricultural Structure (Anatolia)]. Istanbul: Türkiye Şeker Fabrikaları A.Ş. Neşriyatı; 1951. 128p.
11. Taşligil N, Şahin G. Developments and restoration of hemp (*Cannabis sativa L.*) cultivation in Turkish agriculture. In: 1st Istanbul International Geography Congress Proceedings; 2019 Jun 20-22; Istanbul, Turkey. Istanbul: Istanbul University Press; 2019. pp. 456-78.
12. European Cooperative Programme for Plant Genetic Resources. Hemp National Collection Country Report for Turkey. Paper presented at: Second Meeting of the ECPGR Working Group on Fibre Crops (Flax and Hemp); 2010 Jul 7-9; Velké Losiny, Czech Republic.
13. Hakki EE, Kayis SA, Pinarkara E, Sag A. Inter simple sequence repeats separate efficiently hemp from marijuana (*Cannabis sativa L.*). *Electron J Biotechnol*. 2007;10(4):570-81. Doi: 10.2225/vol10-issue4-fulltext-4.
14. Pinarkara E, Kayis SA, Hakki EE, Sag A. RAPD analysis of seized marijuana (*Cannabis sativa L.*). *Turk Electron J Biotechnol*. 2009;12(1):1-13. Doi: 10.2225/vol12-issue1-fulltext-7.
15. Kayis SA, Hakki EE, Pinarkara E. Comparison of effectiveness of ISSR and RAPD markers in genetic characterization of seized marijuana (*Cannabis sativa L.*) in Turkey. *Afr J Agric Res*. 2010;5(21):2925-33. Doi: 10.5897/AJAR.9000122.
16. Clarke RC. Traditional fiber hemp (*Cannabis*) production, processing, yarn making, and weaving strategies: Functional constraints and regional responses: Part 1. *J Nat Fibers*. 2010;14(2):118-53. Doi: 10.1080/15440478.2010.482324.
17. Clarke RC. Traditional fiber hemp (*Cannabis*) production, processing, yarn making, and weaving strategies: Functional constraints and regional responses: Part 2. *J Nat Fibers*. 2010;14(3):229-50. Doi: 10.1080/15440478.2010.504043.
18. Turet JS. Hemp (*Cannabis sativa L.*) Cultivation in North-Central Turkey. *J Ind Hemp*. 2002;7(2):73-81. Doi: 10.1300/J237v07n02\_07.
19. Deferne JL, Pate DW. Hemp seed oil: a source of valuable essential fatty acids. *JiHA* [Internet]. 1996 [cited 2023 Aug 02];3(1). Available from: <http://www.internationalhempassociation.org/jiha/iha03101.html>
20. Findley CV. *The Turks in World History*. Oxford: Oxford University Press; 2005. 320p.
21. Sherratt AG. Sacred and profane substances: the ritual use of narcotics in Later Neolithic Europe. In: *Sacred and Profane: Proceedings of a Conference on Archeology, Ritual and Religion*. Oxford: Oxford University Press; 1991. pp. 50-64.
22. Clarke RC. *Hashish!* Los Angeles: Red Eye Press; 1998. 387p.
23. More than 7 million Cannabis roots seized in SE Turkey. *Hürriyet Daily News* [Internet]. 2020 Jun 22 [cited 2023 Aug 02]. Available from: <https://www.hurriyetaidailynews.com/more-than-7-mln-Cannabis-roots-seized-in-se-turkey-155903>
24. Reitox National Focal Point. 2014 national report (2013 data) to the EMCDDA [Internet]. [place unknown]: EMCDDA; 2014 [cited 2023 Aug 02]. Available from: [https://www.emcdda.europa.eu/publications/national-reports/turkey-2014\\_en](https://www.emcdda.europa.eu/publications/national-reports/turkey-2014_en)
25. Crosby AW. *America, Russia, hemp, and Napoleon: American trade with Russia and the Baltic, 1783-1812* [Internet]. Columbus: Ohio State University Press; 1965 [cited 2023 Aug 02]. 320p. Available from: <http://hdl.handle.net/1811/24623>

26. Hut D. Doğu Karadeniz'de Geleneksel Dokumacılık : Rize Keten Bezi (Feretiko) ve Sosyo-Ekonomik Etkileri [Traditional weaving in the eastern Black Sea region: Rize linen fabric (Feretiko) and its socio-economic effects]. J Turk Cult Stud. 2011;24:23-62. Doi: 10.24058/tki.280.
27. Akpınar D, Nizamoğlu A. Cannabis production from Ottoman to Republic. Turkish Studies-Social Sciences. 2019;14(4):1223-36. Doi: 10.29228/TurkishStudies.23448.
28. Üzümeri E. Kastamonu Kendirciliğinin Vaziyeti Umumiyesi [General Status of Kastamonu Hemp]. Kastamonu: Ülku Basimevi; 1938. 29p.
29. Iyriboz N. Kendir [Hemp]. İzmir: Ege Basimevi; 1942. 19p.
30. Incekara F. Türkiyede yetiştirilen önemli kenevir çeşitlerinin saplarında lif bakımından ontogenetik, anatomik, morfolojik ve teknolojik araştırmalar [Fiber in the stalks of hemp varieties grown in Turkey, important ontogenetic, anatomic, morphological and technological investigations]. Ankara : Ankara Üniversitesi, Ziraat Fakültesi, 1956. 204p.
31. Savaş R. Ticaret ve Endüstri Bitkileri (Özel Tarla Ziraati) [[Trade and Industrial Crops] (Special Field Agriculture)]. Ankara: Kardes Matbaası; 1969. 187p.
32. Ekiz E, Sümer H, Er C, Neşet A. Kenevir Tarimi ve Mevzuatı [Cannabis Agriculture and Legislation]. Ankara: Tarım Orman ve Köyşleri Bakanlığı; 1989. 74p.
33. Güçer A, Alluşoğlu S. Kastamonu Yöresindeyetiştirelin Kenevirin Azotlu Gübre İsteği [Growing in Kastamonu Region, Cannabis Requirement for Nitrogenous Fertilizer]. Ankara: Başbakanlık Köy Hizmetleri Genel Müdürlüğü Yayınları; 1996. 24p.
34. FAOSTAT [Internet]. Roma: FAO; 2020 [cited 2023 Aug 02]. Available from: <http://bit.ly/2M55nzA>
35. European Monitoring Centre for Drugs and Drug Addiction. Turkey Country Drug Report 2019 [Internet]. [place unknown]: EMCDDA; 2019 [cited 2023 Aug 02]. 24p. Available from: [https://www.emcdda.europa.eu/publications/country-drug-reports/2019/turkey\\_en](https://www.emcdda.europa.eu/publications/country-drug-reports/2019/turkey_en)
36. United Nations. Single Convention on Narcotic Drugs, 1961 [Internet]. New York: UN; 1961 [cited 2023 Aug 02]. Available from: [https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg\\_no=VI-15&chapter=6](https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=VI-15&chapter=6)
37. Türk Standardları Enstitüsü. Turkish Standard. [place unknown: publisher unknown; cited 2023 Aug 02]. Available at: <https://intweb.tse.org.tr/Standard/Standard/StandardAra.aspx>

#### ALTERNATIVE LINK

<https://agrocienciauruguay.uy/index.php/agrociencia/article/view/1166/1482> (pdf)