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## **FACTORIES FOR PROCESSING INDUSTRIAL HEMP IN SLAVONIA AND BARANJA**

### **TVORNICE ZA PRERADU INDUSTRIJSKE KONOPLJE NA PODRUČJU REGIJE SLAVONIJE I BARANJE**

#### ***ABSTRACT***

*Industrial hemp is in Slavonia, Baranja and Srijem cultivated for centuries, and was used in human's nutrition and domestic animals as well as raw homemade, artisan trades, and (later) in the industry. First processing factories of industrial hemp were built in the second half of the XIX century. This paper provides an overview of the establishment and operations hemp processing factories in the region of Slavonia and Baranja since the mid-XIX by the end of the XX century - when the industrial production ceases, and factory are disappearing. At the beginning of the second decade of the XXI century in the world is renewed cultivation and processing of hemp and this interest occurs in the Republic of Croatia. No specific initiatives for the industrial processing of hemp and briefly describe the project idea of renewal one hemp plant in the region Slavonia and Baranja.*

**Keywords:** *Agricultural production, Hemp factory, Hemp processing, Industrial hemp*

#### ***SAŽETAK***

*Prve tvornice za preradu industrijske konoplje – kudeljare, kako je u narodu prihvaćen naziv – izgrađene su u drugoj polovici XIX. stoljeća. U radu se daje pregled osnivanja i poslovanja kudeljara na području regije Slavonije i Baranje od sredine XIX. do kraja XX. stoljeća – kada ova industrijska proizvodnja prestaje, a tvornice nestaju. Početkom drugog desetljeća XXI. stoljeća u svijetu se obnavlja uzgoj i prerada konoplje te se ovaj interes javlja i u Republici Hrvatskoj. Još nema konkretnih inicijativa za industrijsku preradu konoplje te se ukratko opisuje projektna ideja obnove jedne tvornice kudjelje na području regije Slavonije i Baranje.*

**Ključne riječi:** *Industrijska konoplja, Kudeljare, Prerada konoplje, Ratarska proizvodnja*

#### **1. Introductory notes**

At the end of the nineteenth and early twentieth century in the Slavonia and Baranja region was built ten hemp processing plants so-called „Kudeljara“ who used hemp from regional areas. As a

curiosity it should be noted that the first weaving flax and hemp in the today's Croatian area was founded by Count Batthyány in Ozalj 1720 - that worked until the end of the century. The first manufactory ropes of hemp was founded 1763 in Rijeka to utilization of hemp from Croatia and Slavonia. Later established a large rope-makers nobleman Adamovich in Cebin which has exported its products to Western Europe all the way to Amsterdam.[2]

Although the tradition of growing and processing of hemp in Slavonia and Baranja region no more than significant papers about the past of this economy sector. There is little data on production, technology and employment in hemp processing plants such and little-numerous literature on this industry in the region and is even difficult to find photos of these factories.

The aim of this paper is, therefore, finding, data processing and assessment (determination) essential elements of the history of hemp processing in Slavonia and Baranja region. Due to climatic and agro-technical conditions slavonian region is suitable for the hemp cultivation. In other Croatian regions is not a hemp grown. It should be noted that hemp - due to transport costs - processed in nearby of breeding which means that this research has a national framework. This paper, therefore, composed a mosaic of history of hemp plant (kudeljara) in the region of Slavonia and Baranja ie in Croatia.

## **2. Factories to hemp processing in the Republic of Croatia**

The first written record of hemp in the area of Slavonia and Baranja region dates back to the second half of the nineteenth century; the estate of the Archduke Carl von Österreich-Teschen (1822-1847) initiated regulation of Karašica, Drava and Danube rivers (canals, embankments and tunnels) and it has continued Albrecht Friedrich Herzog von Teschen (1847-1895) on the regulation of flows the Danube and Drava and the coarsening of land and construction of water-protective facilities. After the construction of the Albrecht embankment (from village Zmajevac to village Kopačevo) in year 1868 opened up a new possibility to using new land for agricultural production. As in neighboring Vojvodina and here was launched production of hemp.[1][3][12][18]

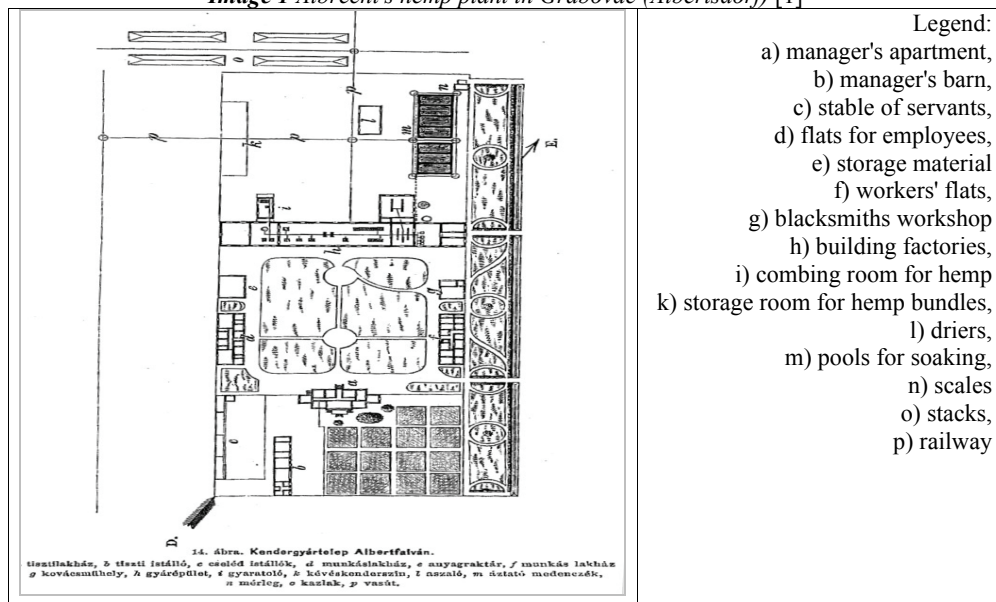
At that time already widely cultivated hemp in Hungary Danube and neighboring Vojvodina (Apatin and Bačka district) and are exported to Germany and England. Dr. Heinrich Ditz wrote in 1867 on the cultivation of hemp on the Belje estate; in addition to tobacco, in Pannonia is suitable production of hemp, and thus allows for the mitigation of excessive production of grain and allows changes in crop rotation. Can be pleased considered increasing production of hemp that is typical of Bačka. There are also factories for processing raw materials.[3]

### **2.1. Albrecht's hemp plant in Grabovac (Albertsdorf)**

Ditz, had never met with production and processing of hemp in Backa, but provides data on Archducal estate „Belje“. Ditz writes: "The Belje archducal manor and after two years with great satisfaction is producing hemp. They strive to be main product, and on the estate in 1867 want to start work on hemp processing plant. It will not start production on a large scale before will examine the possibility to sell and find business partners abroad. This can be achieved only large estate and smaller manufacturers to be more difficult to achieve and find new markets. "In this Ditz see the importance of large estates and points out that already in the previous chapters of the book on it warned. In the production of hemp, among estates, emphasizes to protect highlights Futog (Futok) in South Bačka. " [3]

A good yields of hemp in Bačka writes and Baron Arthur Hohenbruck 1864 in the Report of the First Dalmatian-Croatian-Slavonic exhibition in Zagreb in 1864: "Hemp thrives in all places, especially thrives in Slavonia and would have to be and should produce in Slavonia wholesale, because it is an important product that can be exported. As a raw material brings a lot of money, as it is in the Apatin in Bačka." In the Apatin and the surrounding area has expanded production of hemp, so that the manufacturers sell their goods and the estate in Baranja, across the Danube, and provides a description of Albrecht hemp plant in Grabovac (Albertsdorf) [1]

**Image 1** Albrecht's hemp plant in Grabovac (Albertsdorf) [1]

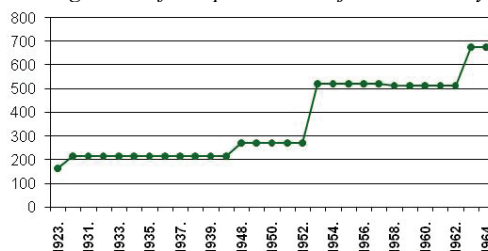


"In 1867 was built hemp plant near to Grabovac on the edge of the reeds, and since it was not near water mill, as a fuel for steam boilers used pozder (remains of crushed hemp). The factory is 1880 years were 70 workers, and the tow was exported to Belgium, England, Germany and Switzerland. Transportation was very expensive; port in the Bezdan (Danube) to London transport costs were 4 forint (for half ton). In 1880 the value of hemp-spinning mill was 326,000 forints.[1] Except to hemp processing from the Belje manor hemp plant in Grabovac also processed raw material that is being transported from Bačka. Figure 1 shows a plan view of Albrecht's hemp plant in Grabovac.

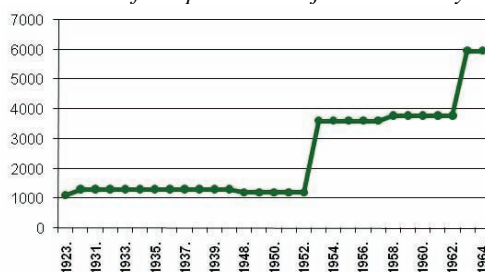
## 2.2. Factory of hemp and flax - Darda

For now they set no date of establishment Factory of hemp in Darda; according [14] "after World War II, „Belje“ is devastated and destroyed. The old hemp-spinning mill was nationalized and destroyed, and a new hemp-spinning mill by-raised in 1953 and then was employed about two hundred people." In the monograph "Three centuries of the Belje" contains data on hemp production in „Belje“ since 1923 [13] and may be assumed to be processed in Factory of hemp and flax in Darda. Figure 1 and 2 show average area of cultivation of hemp to "Belje" and production of hemp in factory - Darda.

**Figure 1** The average area of hemp on the "Belje" in selected years – ha [13]



**Figure 2** Production of hemp on the "Belje" in selected years - t [13]



In the monograph "Slavonia '64" states that the director of Factories hemp and flax Darda was Vaso Eraković. [4] Decision to liquidate the hemp-spinning mill was made flood, in 1965, time to complete the processing of existing stocks of the company. [13] Belje hemp-spinning mill ceased its operations 8.1.1968. year. Since that time the plant hemp and hemp-spinning mill no longer found in the area of the „Belje“ manor.[14]

**Image 2** The building of hemp factory in Darda [14]



### 2.3. Factories of hemp in Vukovar

In the town of Vukovar in 1905 established Vukovar hemp factory Inc. which employed 191 workers, with capacity of 80 to 120 wagons hemp annually.[14] At that time this was the largest hemp factory in this part of Europe. The main shareholder is the Hungaria-Han-ffabrik Inc. from Vrbas offered the cities of Vukovar and Vinkovci electrification. Hemp factory enters into regular operation in 1907 and "Hungaria" gets from the City Council of Vukovar concession for 50 years for electricity supply. Thus, in Vukovar, December 19, 1909 years it work first power system on the territory of Slavonia and Baranja region. [25]

*Image 3 Hemp plant Hungaria under construction (1905.)*



Shareholder's equity Vukovar hemp factory Inc. amounted to 1.6 mil. Crowns, of which 30% belonged to the Vukovar estate, and the rest factory Hungaria Inc. from Novi Vrbas. Vukovar estate has committed itself to the 31 years of delivering hemp with an area of 1,000 acres per year for the needs of the company; after the expiry of 30 years should have factory free pass into the ownership of landed estate. But already in 1910 estate was taken over another 40% of the shares and thus gets the lead in the factory, and in 1912 takes Countess Maria Eltz and other equity of hemp factory Hungaria. "By the end of 1918 Hemp factory operates with a nice success, but the years of war have left traces, especially the post-war, in the first place due to lack of raw materials." For example - in 1913. Was in stock 106,000 quintals. hemp stem, and in 1916 only 39,000 quintals. "Because of the unfavorable economic conditions 3 February, 1919 was adopted by the General Assembly of hemp factory conclusion that factory annul and placed in liquidation. That year established new company - Vukovar hemp-spinning mill Inc. by Dragutin Count Eltz and the first Croatian Savings Bank. But, problem of raw material was still present, especially because of the agrarian reforms, so that the factory soon had to stop working. As hemp factory also delivered electricity to Vukovar municipality, it fell into increasing liabilities and 1925 estate sold their shares to Geza Grosso from Veliki Bečkerek (Vojvodina).[15]

*Image 4 Hemp factory Hungaria, Vukovar (1909)*



Factory hemp Vukovar in 1958 merged with the Holding „Borovo“. In the "Borovo" hemp (mixed with paper pulp) used to create the return-transport packaging for footwear. In Vukovar, there was another hemp plant - in Dubrava - which in 1956 merged with the Agricultural Combine Vukovar at that time, the company employed fifty workers. [28]

**Image 5** Hemp factory at Dubrava, Vukovar (1956)



For far there is no information on cessation of the hemp plants in Vukovar. The reports of the Cooperative Association of Slavonia and Baranja on the organization of farmers, villages capacities and results of their use in Slavonia and Baranja, on the 1981 - 1983 year [20][21] contains data on surfaces and nature of hemp in the private sector that are not mentioned the cultivation of of hemp in the Vukovar area; table 1.

**Table 1** Sown areas and yields of hemp in the private sector in the region of Slavonia and Baranja

Općina	Sown areas (ha)			Yields of hemp (t)		
	1981	1982	1983	1981	1982	1983
D.						
Miholjac	238	283	270	1,963	2,285	2,170
Đakovo	0	0	15	0	0	125
P.Slatina	0	0	6	0	0	26
Valpovo	70	100	35	790	1,020	140
	308	383	326	2,753	3,305	2,461

Source: [20][21]

This points to the possibility that hemp may produce only the surfaces of PIK Vukovar or - if this is not the case, that the two hemp plants in Vukovar already stopped work to that period.

#### 2.4. Factory of hemp - Viškovci

Several authors mentioned business of hemp plant Viškovci (near Đakovo) but nobody said a year of its foundation and construction. Zdenka Šimončić writes that hemp plant established by the Agricultural Society and had 93 employees.[16] By II. World War in area of Đakovo was 10 hemp plants in Vuka, (two), Široko Polje, Tomašanci, Gorjani, Forkuševci, Kešinci, Mrzović, Krndija and Viškovci. They produced more than 1,500 tons hemp and 550 tons flax fibers. At the time, capacity of Viškovci plant was 300 tonnes per year. After II. World War, only two plant continued to operate; in Tomašanci, which was in operation until 1967, and Factory in Viškovci which burnt 1942 and restored 1947. From 1947 to 1951 Factory Viškovci worked as part of the General Directorate of People's Republic of Croatia for flax and hemp in Zagreb, then - until 1953, as part of the hemp factory in Osijek, and then operate independently until 1964. \* [9]

\*1962 in Factory Viškovci produced 527 tons of wet hemp fiber, 234 tons of green fiber and 146 tonnes wet flax; a total of 907 tons. Other is a large amount puzder, the inner part of hemp or flax stalks.

**Image 6** *Products of hemp factory Viškovci*



Since 1964 hemp plant Viškovci is composed of PIK Đakovo that within hemp plant Viškovci builds plant for production kolanit plates, and in 1967 completed construction of the lake to wet stems, hand-wetting is mechanized and increases productivity and economics. At that time in PIK Đakovo arable farming produces about 3600 t of hemp for Viškovci and in Tomašanci which process 1000 wagons hemp stalks and these products cca 6000 m<sup>3</sup> pozder plate.

As with other hemp plants - manufacture of synthetic fibers is reduced in order Viškovci and subcontractors (private farmers) leave production of hemp to be retained only in state sector within the PIK Đakovo. In fact, until 1964 private farmers have given a 90% raw material for Viškovci plant that already in 1966 the entire production of the stem was in the state sector. It should be noted that 80% of production plant Viškovci and Tomašanci from period 1946 - 1965 was sold on the German market. [9] In the monographs "Slavonia" (from 1964 to 1985.) just mentioned plant Viškovci and Tomašanci [6] and Factory hemp and kolanit plate - Viškovci in which the director Šimo Jurisic. [8]

In 1975 PIK Đakovo invest to Viškovci in hemp processing; for construction of the hall and imported machines spent three million dinars, and resulting double daily processing of fibers, ie instead of 3-4 tons, even 6-8 tons in three shifts. New mechanization gives more of splint, so that daily production kolanit plate significantly increased; from 17 to 19 cubic meters. All this is achieved with better hygienic conditions, while the injured workers reduced to a minimum. Plant Viškovci in the mid-80s, produced two main products: hemp fiber and kolanit plate and in 1983 and 1984 used the seeds of hemp as a raw material for production technical oils and bird food. [9]

**Image 7** *Factory od hemp Viškovci - late 1980s*



In the mid 80's PIK Đakovo has grown hemp in about 400 ha per year, which resulted in derivative with between 900 and 1,000 tons and tow 2500-3500 m<sup>3</sup> kolanit plate. Hemp factory in Viškovci worked to 1994<sup>th</sup>-95<sup>th</sup> when in process of privatization of public property PIK Đakovo disbanded. "Based on the conclusions of the Company Board since 11 March 1994 composed operational plan for cessation of work, in March 1995, ceased its operations business plant Viškovci, whose main

activity was production of fibers and kolanit plate of raw material basis greater hemp. Operational Plan identified the main reasons for the termination of operations aware business units and low prices of basic products and fiber plate, permanently reducing production due to reduced demand and permanent negative financial result in the period from 1989 to 1994. All employment, 70 of them, arranged in other business units within the company. Estimated value of the property listed in the Study is 869,943 DEM. [26]

## **2.5. Factory of hemp - Vladislavci**

Petar Anić in the book [1] regarding hemp brief noted: "The primary processing dealt with "First Slavonia mechanical weaving cloth" by Ivan Friedler founded in 1901, at Osijek and factory in Vladislavci. Both factories are processed flax and hemp. In addition to these two weaving in Osijek was founded weaving in 1921 by Alfred Kuch. For processing of hemp in the region Osijek there were a number of smaller hemp-spinning mill. These are largely due to poor interest of producers to plant hemp, after World War II liquidated or working with smaller capacity.[1] Zdenka Šimončić noted that in 1903 established Slavonian industry of hemp and flax Inc. Vladislavci and employed 150 workers. Also the author of newly diagnosed patients that in 1903. In Vladislavci was founded second Hemp-spinning flax industry Inc. Vladislavci with 87 workers.[16] In the monograph "Slavonia '64" noted that a part of IPK Osijek there hemp plant, which has two facilities in Vladislavci and Seles. Average annual processing capacity was around 7,500 tons we can and green stems of which produces about 1,200 tons of hemp fibers and a rest product of t Factory is pozder. As director of the factory says Ljuban Vojnović.[14] Hemp-spinning and flax Vladislavci allocated to 3.1.1973 from the IPK Osijek and integrate into the furniture factories Mobilia Osijek.[10] In the monograph "Slavonia '70" mentioned Factory hemp Vladislavci and hemp plant Seles and emphasizes that two operations exported hemp product to Western markets, and in the monograph "Slavonia '85" mentioned Factory sliver plate Vladislavci and states that director of the company is Ljubo Prica.

## **2.6. Factory of hemp - Črakovci**

### **Establishment and organizational changes**

Factory of hemp and flax Črakovci was built as a completely new facility 1947/48, as an independent company and began to work as part of the General Directorate of industry flax and hemp People's Republic of Croatia at Zagreb. This Department was disbanded in 1950, and is based on-vices "Factory hemp", based in Osijek, consisting of up to the beginning of 1953 were all hemp-spinning mill in Croatia. Factory of hemp as a standalone company began operations on 1 January 1953, and was established by the decision of the People's Committee in Donji Miholjac 21 February 1953. From 1 January 1965 to 31 March 1969. factory went hemp-wave part of the PIK Donji Miholjac and from 1 April 1969, is part of IPK Osijek as a working organization. Constituting Factory hemp and flax Črakovci - as part of IPK Osijek sector "Agriculture" Donji Miholjac was made June 10, 1981.[10]

### **Production and technology**

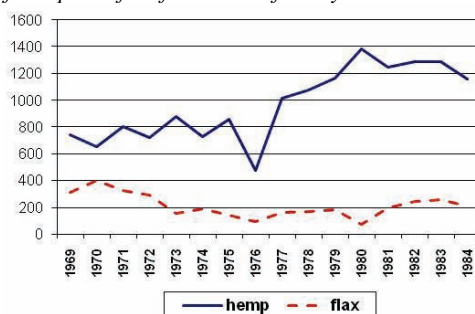
Factory of hemp and flax Črakovci in its production program a production hemp and flax fibers as primary production and briquettes and mehabita as a secondary activity. Annual production was around 1,100 tons of hemp-fiber legs and 400 tons of flax, which was 76% of installed capacity. Products Capacity were about 500 tons mehabita (floor coverings; bitumi-nous pozder) and about 2,000 tons of briquettes splint which is sold as fuel for ovens. Figure 3 shows the pro-duction of hemp and flax fiber in the period from 1969<sup>th</sup> to 1084<sup>th</sup> year

**Image 8** Production complex of hemp and flax factory Črnkovci [24]



By the production of fiber hemp and flax Factory in Črnkovci was in first place in Yugoslavia, and that is the only producer of flax fibers in the country and a major exporter of hemp and tow. Factory is in better years employed about 400 workers. In late 1984, the Factory began the construction of spinning flax in Črnkovci capacity of 1,000 tons of yarn per year, which is the next phase in finalization of the fibers in the yarn to the finest numbering. The production is mainly intended for export and import substitution. During 1987 investment is completed, the plant was put into operation, and employ about 50 new workers. In the monograph "Slavonia '85" mentioned Hemp and flax factory Črnkovci and states that the director of the company is Zdravko Stanić. [12]

**Figure 3** Production of hemp and flax fiber in the factory Črnkovci 1969<sup>th</sup> to 1984<sup>th</sup> - tons [10]



After four decades of successful work Hemp factory Črnkovci was 1996 declared bankrupt and the company is in liquidation; machines were sold in 2006, and part of the property (halls and land) are given in the lease. [27]

### 3. Visions of hemp processing and development in Slavonia and Baranja

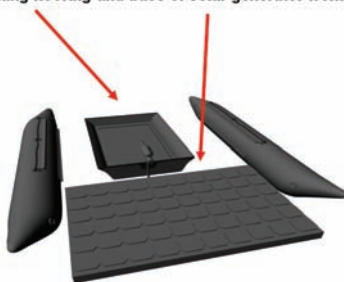
So far known activity on hemp in recent years are based on hemp (its grain) for food and produce hemp oil. The only publicly known initiatives for processing of hemp stalks (ie production of hemp) in Osijek is by bussines assotiation "Ownerhood" Osijek. Based on the accepted patent for catamaran vessel (boat with grating and inflated barrel solar powered) company develops a prototype of the boat and perform experiments with hemp material for making flooring of the vessel; Figure 10. Namely, the material of the hemp is very sturdy and low specific weight and organic, technologically and financially (relative to aluminum) acceptable for the preparation of this part of the vessel. But for the mass production of this boat is required processing plant hemp stalks.[17]

"Ownerhood" Osijek has set up a development model conglomerates which will be constituted and was hemp plant. It is a broader macroeconomic concept that is based on the association of field

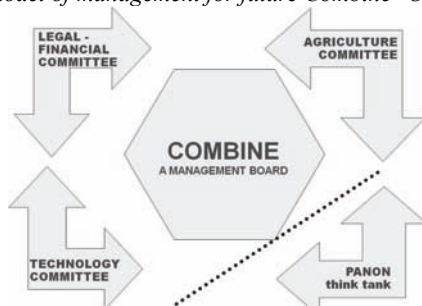
capacity (production of hemp) capacity for processing industrial hemp and small businesses (product line of hemp). Objective function of this association is not only purely profit but also social development within the ecological paradigm (sustainable production of quality of human life). Efforts are under way to find the future location of hemp plant and project documentation. This project - which is not based solely on capital-based but also includes new relationships participation of small businesses in cooperation with the profession and science - will be managed by Managerial Board; image 10.

**Image 9** *The building blocks of catamaran vessels solar powered [17]*

Creating flooring and base of solar generator from hemp



**Image 10** *Proposed model of management for future Combine "Ownership" Osijek [17]*



#### 4. Conclusion

Evident is a long tradition of growing and processing hemp in Croatia, especially in the region of Slavonia and Baranja in the last two centuries. In this paper is first time collected data on the existence and operations of six hemp plants in Slavonia and Baranja, and it was noted the existence of a dozen plants for the hemp processing in the region that operated a hundred years ago. Further research on hemp plants is needed on the basis of documents from public and private archives.

Evident is the return of industrial hemp in the world and in Europe with a full range of thousands of products. On the Croatian territory again, after 20 years, grown hemp and homemade processed hemp for food (flour and oil), and run the projects for processing hemp stalks.

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