

瓊麻 SISAL

瓊麻的生態與價值 ECOLOGY AND CONTRIBUTION OF SISAL

(一)瓊麻的習性

瓊麻中文又稱刺麻、西沙爾麻或假羅麻。屬龍舌蘭科，多年生草本植物，是世界上能夠提供繩索、蓆類等硬質纖維作物之一。生長地帶以在北緯25°~26°，年平均溫度22℃以上，年雨量不超過1500公釐之地區為最理想，是一性向陽光與須要通風的陽性植物。

瓊麻的適應力特強，不僅能夠耐旱且能生長在貧瘠土地上，雖是砂質岩礫地區，只要排水良好，土壤疏鬆，含有豐富的鈣質者，皆適合栽培。原產於南美洲的墨西哥一帶，1901年(光緒廿七年)移植本省，主要栽培於屏東縣的恆春地區、台東縣及花蓮縣境。

恆春在地質上屬恆春石灰岩地帶，土壤中含有多量的鈣質成分，很適宜瓊麻的生長，遍布於恆春西海岸、丘陵以及滿州平原。

(二)瓊麻的品種

瓊麻在栽培種植中有二種變種，一為綠葉種，一為白葉種。本島所栽培者為綠葉種，白葉種因纖維質較差，故本島種植數量稀少，只在金門、馬祖地區成為野生的瓊麻，僅供觀賞。

(三)瓊麻的繁殖與培育

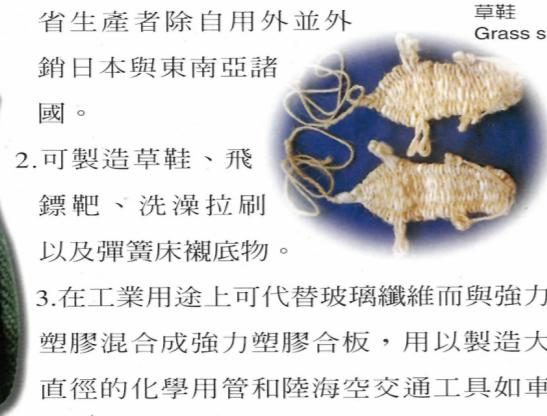
瓊麻的繁殖不用種子而用根芽或珠芽，根芽生長於母株根部附近，珠芽則生長於花軸上的花腋中。根芽與珠芽實際上皆是一棵完整的小麻苗，麻農將麻苗植到苗圃培育至卅公分左右，再移植到麻園中。約三至四年後，即可採割麻葉，以後每八至十二個月可採收乙次。



麻絲 Sisal fiber

人類對瓊麻的利用在於它的纖維。瓊麻纖維為白色，有光澤，長度大約75-120公分。浸在鹽水中耐腐力佳。也因此：

- 1.是昔日提供漁網、繩索的主要原料。本省生產者除自用外並外銷日本與東南亞諸國。
- 2.可製造草鞋、飛鏢靶、洗澡拉刷以及彈簧床襯底物。
- 3.在工業用途上可代替玻璃纖維而與強力塑膠混合成強力塑膠板，用以製造大直徑的化學用管和陸海空交通工具如車船等材料。早期的墨西哥人曾拿來做為酒精的原料。
- 4.瓊麻渣是很好的綠肥。台灣省畜產試驗所曾於民國56~58年間利用麻渣來作為栽培草菇的試驗，試驗結果良好。
- 5.瓊麻葉子的尾端有一尖硬的刺，軍事單位常種植於營區附近，形成一大片的面積後可成為反空降部隊的阻隔物。
- 6.麻汁液中發現含有一種價值極昂貴的人體荷爾蒙。恆春纖維股份有限公司曾設廠提煉。
- 7.枯萎的麻莖以及整株花軸是昔日農民們最容易取得與最易於點燃的燃料。



魚網 Fishing net

草鞋 Grass slipper



長在石灰岩土壤上的瓊麻 Sisal growing from the limestone soil



白葉瓊麻 White leaves of sisal



絞碎後的麻絲正製成填充物 Sisal fiber after being crushed is manufactured as mattress fillers



漁船用纜纜 Hawsers for ships

(1)The Characteristics of Sisal:

The sisal belongs to the Agavaceae species, and its Chinese name is "Chin Ma," "Hsi Sha Mi Ma," or "Chia Luo Ma" It is a perennial plant, and is the sole plant in the world coming from a hard fiber crop that is made into rope, mattresses, etc.

Sisal is a plant with simple needs that will grow anywhere that has the right temperature range and adequate sunlight. Because of this it adapts easily to its environment. For example it can be planted in land that is dry with poor nutrient content. Although it can grow near rocky seashores, it can be cultivated only if the land has good drainage and loose soil with a high calcium content. Its growth zone is at 25-26 degrees north latitude, and the average annual temperature it needs is above 22 degrees Celsius. However, an area with a precipitation of less than 1500 mm per year is the ideal place.

Sisal was introduced from Mexico in 1901, and the main areas for cultivation in Taiwan included Hengchun, Pingtung County, Taitung County, and Hualien County. The soil of Hengchun is rich in limestone, so there is abundant calcium suitable for the growing of sisal. Therefore, sisal is widely planted on the west coast and hills of Hengchun and on the plains of Manchou.

(2)Varieties of Sisal:

There are two varieties of sisal that are planted in Taiwan: one has green leaves, the other has white of silver colored leaves. The variety of sisal planted the most in Taiwan has green leaves, as

瓊麻花 Sisal flowers



the fiber quality of the white leaf variety is much poorer. This latter variety is only planted in the areas of Kinmen, Matsu, etc. as a wild plant for its decorative quality.

(3)The Cultivation of Sisal:

Sisal has no seeds, but has sprouts which grow around the base of the stem, and buds which grow in the receptacle. The sprouts and buds are in fact seedlings which farmers plant. Farmers will allow these seedlings to grow until they are about 30 cm. Then, they move them to the sisal garden. After 3-4 years, the leaves of the sisal can be harvested; subsequent harvesting can be done once every 8-12 months.

(4)The Uses of Sisal:

Human beings use the fiber part of sisal. The fiber of sisal is a lustrous creamy white with a length of about 75-120 cm. It has good resistance to salt water, and therefore the hemp rope can still retain its strength after being in salt water for a long time.

1. In the past, sisal was the main material for making rope, hawsers, fish nets, etc. Other than for products privately used in Taiwan at present, the sisal is exported to Japan and Southeast Asian countries.

2. It can be made into grass shoes, darts, bath brushes, and linings of spring beds.

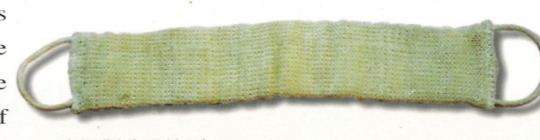
3. For industrial use, it can replace glass fiber that is mixed together with plastic materials for manufacturing plastic plywood. This can be made into large chemical tubes and army transportation equipment, such as automobiles, trucks, etc. In the early stage of its development Mexicans used the agave plant for the manufacture of alcohol.

4. Sisal scraps make very good fertilizer. In 1967-69 the Taiwan Provincial Husbandry Laboratory Office had used sisal scraps to cultivate mushrooms, and the results of this test were excellent.

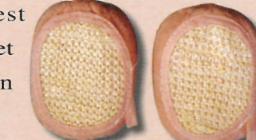
5. A hard thorn grows at the end of sisal leaves, so the military units often plant it around the perimeter of campgrounds or bases to act as a defense against enemies.

6. In the liquid of sisal scraps, researchers discovered a valuable hormone for the human body. The Hengchun fiber Co., Ltd. has established a factory to refine it.

7. The withered sisal stalk and whole stem are the easiest parts for the farmers to get and are materials that burn easily.



麻繩製洗澡拉刷 Bathing brush made of sisal fiber



麻製洗身刷品 Bath brushes made of sisal fiber

從根部長出的根芽 Spouts grown from the root



麻葉可抽取麻絲加工 Sisal fiber yarn being processed



麻絲可製繩索 Sisal fiber can be made into rope

瓊麻對恆春地區社會經濟發展的影響 THE INFLUENCE OF SISAL ON THE SOCIAL AND ECONOMIC DEVELOPMENT OF HENGCHUN



搬運瓊麻 Hauling sisal

(一)全年增加數千萬元收入

恆春鎮在民國50年之種植面積為4460公頃，麻絲總收穫量6165公噸，佔屏東縣栽培面積的65%，佔全省50%以上，為本省主要的瓊麻產地。如以民國58年每公噸平均價格6.83元，其收穫麻絲量6165噸來計算，則全鎮全年收益為4210萬6580元。

當時恆春地區計有七家麻絲行號，每年麻絲交易量約四千公噸；全省其他地區也有九家加工行號，其原料的主要供應地為恆春地區。

(二)麻農佔農民的四分之一

根據民國52年的統計，恆春地區的麻

農有760戶之多，如以每戶平均有三人從事麻業計算，約有5280人從事麻業有關工作，當時農業人口約有20,000人，其中麻農即佔有四分之一的比例。

(三)麻農促進社會經濟活動

麻農由於普遍擁有較高收入，而直接或間接地帶動經濟或社會公益的活動，例如擔任學校的家長會長或委員，貢獻心力與資助款項，嘉惠學園也提高了教育水準。且由於麻農經濟富裕而向地方政治尋求發展，因而在地方政治生態上扮演重要的角色。

(1)Total aggregate annual income of several millions of dollars:

In 1961 Hengchun township had 4460 hectares planted with sisal which had a total yield of 6165 tons. This land was about 65% of the cultivated area of Pingtung County, equivalent to more than 50% of the sisal production nationwide. It was the main area for production of sisal in Taiwan. As an example, in 1969, the average price per kg was \$6.83, and if calculated by the yarn yield of 6165 tons, then the total annual income of Hengchun town was \$42,106,850.

At that time, there were 7 companies for sisal production in the area of Hengchun, and the business trade capacity of sisal yarn was about 4000 tons. Also, there were 7 processing companies for sisal in the other areas nationwide, and the materials were mainly supplied by Hengchun.

(2)Sisal farmers were 1/4 of all farmers:

According to the statistics report in 1963, there were 760 farms planting sisal in Hengchun.

So, if there were 3 farmers in each farm household, then the population engaged in work related to the sisal business was about 5280 people. As the population of agriculture workers numbered about 20,000 people (including sisal production plant workers), the farmers who engaged in sisal production were about 1/4 of all farmers in Hengchun.

(3)Sisal farmers promoted social and economic activities:

Because the income of sisal farmers was often high, the social and economic development activities of the community were directly or indirectly affected. For example, as the Committeeman or Director of the Parents Association in a school the farmer's devotion, contribution of time, and economic support would benefit the school, helping to upgrade its educational level. With the increased wealth and subsequent free time of the sisal farmers, they would look for involvement in politics. Therefore, they would play an important role in the political life of the community.



乾的麻絲再成捆的綁好 Fiber of the sisal



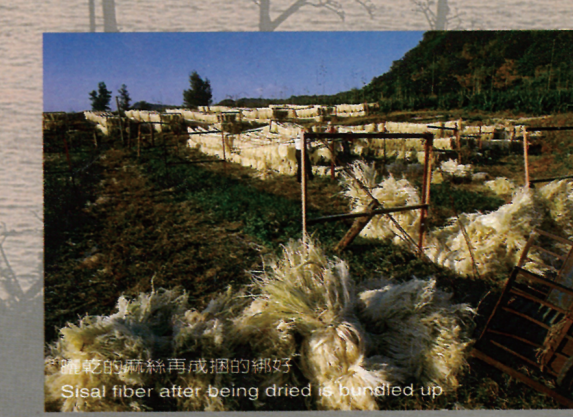
成堆的填充物 Piled fillers



三輪車為載運麻葉到採纖工廠的主要工具 Truck used to haul sisal leaves to the fiber picking factory



麻繩乾的麻絲於路上 Fiber dried in the road



乾的麻絲再成捆的綁好 Sisal fiber after being dried & bunched up

■ 瓊麻對生態環境的影響 THE INFLUENCE OF SISAL ON THE ECOLOGY

(一) 種植瓊麻對熱帶海岸林的影響

熱帶海岸林原分佈於恆春半島海岸，其植物相與台灣其他地區不同，而與菲律賓群島、馬來西亞島嶼等地的植物相似，是本省唯一的海岸林。恆春地區的居民為了大量種植瓊麻，而大肆砍伐珍貴的海岸林，使其面積由數百公頃縮小至28公頃，目前已劃定為「生態保護區」，依國家公園法加以保護。

岸區域，以便於推置麻渣及流放麻汁。然而採織所產生的麻渣及麻汁，卻污染了河川水源及海域生態。民國76年，紅柴坑附近的採織工廠所排放的麻渣汁，曾導致附近海域珊瑚白化。



瓊麻景觀 View of sisal in the sunshine

(1) The influence on the tropical coastal forest:

The tropical coastal forest is spread over the coast of the Hengchun Peninsula, and its plants are quite different from other areas in Taiwan. The plants of this area are similar to plants in the Philippines, Malaysia, etc. This is the only place in Taiwan that has a virgin coastal forest. In order to massively plant sisal, the residents of Hengchun arbitrarily cut the virgin forest down to a small area of only 28 hectares which is now labeled as an "ecological protection area" under the law of the National Parks.

(2) The influence of fiber production on the environment:

The fiber production factories of Hengchun were mostly established around the coastal or river districts, so that the sisal scraps and fluid could be conveniently accumulated. However, the sisal scraps and fluid produced from the fiber factories polluted the rivers and oceans. In 1987, the fiber factories around Hung Tsai Keng that discharged sisal scraps and fluid caused coral whitening around the nearby oceanic area.



曬麻架上的麻絲 Fiber yarn hung on the sisal rack

■ 恆春瓊麻發展歷史概要 BRIEF LOOK AT THE HISTORY OF SISAL IN HENGCHUN

1901年	美國領事Devitson引進試植於台北農事試驗所
1902年	移植於恆春熱帶植物殖育場，試驗成效頗佳
1903年	於屏東縣高樹庄設殖育局附屬熱帶纖維植物苗圃，進行試驗調查，實地研究其經濟栽培之可行性。
1913年	購進Prieto採織機
1914年	採織
1918年	日本之台灣纖維株式會社採織工廠又引進機器，纖維產量大增。熱帶纖維植物苗圃經營，改由太和公司辦理。
1918~1945年	日本為供應二次世界大戰期間戰艦船纜之原料，開始大量種植。光復前栽培面積計331公頃。
1945~1965年	光復後政府積極輔導瓊麻工業，外銷需求量大增，種植面積增至10270公頃，屏東縣為9227公頃，約佔90%，恆春地區為5611公頃，約佔全省總栽培面積55%。
1966年	省農林廳引進可羅娜2B型自動採織機，增添各類設施，於恆春麻場設置「瓊麻自動採織示範實驗中心」交由省建設廳台灣省農工企業公司經營。
1966~1984年	化學纖維尼龍繩索取代瓊麻加工品。種植面積降至980公頃，大部分轉作洋葱、西瓜。
1995年	瓊麻工業歷史展示區對外開放。

1901	The USA Consul, Mr. Devitson, introduced sisal to be test planted in the Taipei Farming Laboratory Office.
1902	Planted in the tropical plant cultivation farm in Hengchun, with excellent results.
1903	Kaoshu Chuang of Pingtung County had established a Cultivation Bureau with Tropical Fiber Plant Seedlings to investigate sisal and research the possibilities of cultivating this economical plant.
1913	Purchased Prieto Fiber Production Machine
1914	Fiber production
1918	The Taiwan Fiber Co., Ltd. of Japan introduced yarn production factory machines for massive yield of fiber production. Tropical Fiber Plant Seedlings was changed to be run by Tai Ho Co., Ltd.
1918-1945	In order to supply the hawsers used for the Japanese ships in World War II, a mass planting was started. Before the Taiwan Retrocession, the area of cultivation was 331 hectares.
1945-1965	After the retrocession, the Government of Taiwan progressively assisted the sisal industry. The demand for exported sisal greatly increased. The planting area was enlarged up to 10270 hectares. In Pingtung County the area of cultivation was 9227 hectares, which was 90% of the nationwide yield. In Hengchun, the area of cultivation was 5611 hectares, which was 55% of the nationwide total.
1966	Provincial Farm & Forest Department had introduced Corna Model 2B, Auto Fiber Production Machine, and had increased the amount of various equipment. In Hengchun, the sisal Automated Fiber Production Demonstration & Laboratory Center was established, and it was operated by the Taiwan Provincial Reconstruction Dept. and the Taiwan Provincial Farm Industrial Co., Ltd.
1966-1984	Synthetic nylon fiber had replaced articles made of sisal. The cultivation area for sisal was reduced down to 980 hectares and most of the farmers changed to growing onions, watermelons, etc.
1995	The Sisal Industry Historical Monument was opened for visitors.

■ 瓊麻工業歷史展示區現況 THE SISAL INDUSTRY HISTORICAL MONUMENT



瓊麻場全圖 Sisal field at Visitor Center

(一) 規劃緣由

1913年，台灣纖維株式會社在恆春鎮草潭路設置恆春麻場(即展示區現址)，1919年正式開工採織；台灣光復後，交由台灣省農工企業公司經營。民國73年墾丁國家公園管理處成立，基於保存人文資產，展示地方特色，本處於75年撥用所有14公頃的麻場，將原有的建築物、曬麻場、自動採織機等設施加以整建，並就瓊麻產業歷史及背景作一整體探究，以規劃「瓊麻工業歷史展示區」，並於民國84年正式對外開放參觀。

(二) 區內設施與展示內容

1. 簡報室

本區內有專用簡報室，可容納五十人，放映有關瓊麻工業歷史的中英文錄影帶，供民眾觀賞。

2. 宿舍殘蹟

民國6年日本人在此成立臺灣纖維株式會社所興建的職員宿舍，建基以磁石為材質，周圍砌以紅磚，屋頂蓋以紅瓦，民國33年日人離去後即行荒廢，本建築殘蹟造型美觀，很值得民眾在此觀賞及拍照留影。



宿舍殘蹟 Ruins of a dormitory

3. 資料展示室

原為日人所建單身宿舍，由於殘破不堪，本處遂於76年依原建築造型整建，並展示有關瓊麻之文獻書刊、瓊麻之成品及半成品、世界及本省植麻分佈圖、瓊麻舊



鳥居 Niao Chu

照片等內容。

4. 鳥居

日人興建神社的一部份，後面有地基殘蹟為原神廟地址，祀奉日治時期台灣較少見的稻荷神祇。臺灣光復後，省農工企業公司人員曾一度改奉土地公，現已荒廢。

5. 鐵軌地磅

本區地勢低窪，而鄰近之西海岸台地為主要種植瓊麻地區，而於1921年即鋪設鐵軌，利用此由上而下之地勢，方便運送麻葉來此採織，節省很多人力與經費。鐵軌上設置台車，而場區內運送則用手推車。

6. 自動採織機房

房內放置民國55年從英國進口的可羅娜2B型自動採織機，本機每日可加工十公噸麻葉，生產約三公噸左右的麻絲，係本省第一部採織水洗一貫作業的採織機，恆春地區麻農後來仿製此機器計有6部，對於恆春地區瓊麻生產貢獻很多。

7. 曬麻場

係省農工企業公司為使麻絲易於晾乾且清潔起見而設置的，這種乾淨的麻較能賣高價錢。

8. 倉庫

磁石砌成的殘蹟，原為臺灣纖維株式會社存放繩索的地方，民國39年省農工企業公司曾改為採織工廠，內置十六臺小型剝皮機。

9. 機具展示室

展示向恆春鎮宏南企業公司購置的梳麻機、合股機、製繩索機和1927年購置的打包機，並繪製繩索製作流程圖。

10. 單身宿舍殘蹟

用磁石建造，殘蹟旁之基地原為日據時期臺灣纖維株式會社建造的麻絲倉庫，毀壞後行政院退輔會於民國55年左右在原址興建官兵宿舍，這些官兵約五十人，主要任務是協助示範實驗中心的採織工作。

11. 大型水塔

不僅提供職工使用，主要是輸送到對面的自動採織機作為沖洗麻絲的水源，達到採洗自動化作業。



鐵軌地磅 Iron rails weighing scale

(1) Background:

In 1913, The Taiwan Fiber Co., Ltd. had established the Hengchun Sisal Hemp Farm on Tsao Tan Rd., Hengchun township (which is the present address of this monument). After the Taiwan Retrocession, it was handed over to be operated by the Taiwan Provincial Industrial Co., Ltd. In 1984, Kenting National Park Headquarters was founded. Based on the premise of protecting cultural assets and local properties, the Headquarters proposed to use the whole 14 hectares for a sisal hemp display and rebuilt some of the original architecture, sisal drying field, auto fiber production machines, etc. Also, research on the history of the sisal industry and the overall background was proposed for the Sisal Industry Historical Monument, which was opened formally for visitors in 1995.

(2) Facilities and Display Inside the Monument:

1. Special Briefing Room:

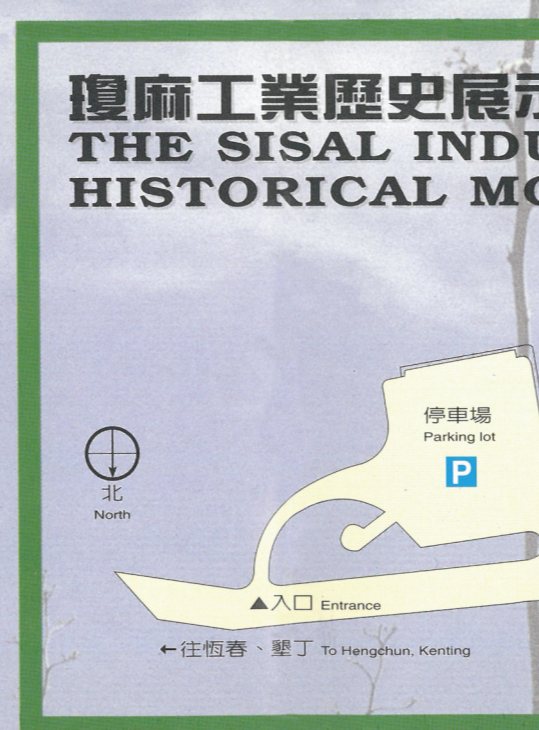
There is a special briefing room available which accommodates about 50 people where a video relating to sisal hemp is shown to the public. There is one video in English as well as one in Mandarin.



簡報室放映影帶 Briefing room, watching a video

2. Dormitory Ruin:

In 1917, the Japanese built a dormitory for employees of the Taiwan Fiber Co., Ltd. on this site. It had been constructed of stone, covered with red brick, and topped with a red tile roof. In 1944, after the Japanese left, this dormitory became a ruin. However, as a ruin it still is beautiful, and the public will often take a picture here.



資料展示室 Data Display Room



資料展示室 Data Display Room

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3. Data Display Room:

This room is in a building originally built by the Japanese to be a dormitory for single men. However, because of its bad state of disrepair, in 1987, the Headquarters rebuilt it and filled it with books, documents about sisal, finished products and semi-finished products of sisal, information on the distribution of sisal in Taiwan and the world, old pictures of sisal production, etc.

4. Niao Chu:

The area at the monument is one of low terrain, and the nearby coastal platform where the cultivation of sisal hemp took place was higher. In 1921, iron rails were put in for a railway to go over the rough terrain and transport the sisal leaves conveniently between the different levels of land. This construction saved much in cost and labor. Flat cars were built on the rails, and these cars were used in the fields.

5. Iron Rails Weighing Scale:

The area at the monument is one of low terrain, and the nearby coastal platform where the cultivation of sisal hemp took place was higher. In 1921, iron rails were put in for a railway to go over the rough terrain and transport the sisal leaves conveniently between the different levels of land. This construction saved much in cost and labor. Flat cars were built on the rails, and these cars were used in the fields.

6. Auto Fiber Picking Machine Room:

In this room a Corna 2B Model auto fiber production machine imported from the United

Kingdom was placed in 1966. This machine could process 10 tons of sisal leaves everyday to yield about 3 tons of sisal hemp, and it is the first fiber production machine with an integrated washing system. There were 6 sets of similar machines in the Hengchun Peninsula which made a great contribution to the sisal yield in Hengchun.

7. Sisal Drying Field:

This was set up by the Taiwan Provincial Industrial Co., Ltd. for easy drying and cleaning of the sisal yarn. Clean sisal can be sold at a higher price.

8. Warehouse:

The ruins show that it was a building that had been constructed of stones and was originally a place to store the rope made by the Taiwan Fiber Co., Ltd. In 1950, the Taiwan Agricultural Industry Co., Ltd. had changed it into a silk processing factory, and had 16 sets of small paring machines inside the warehouse.

9. Equipment Display Room:

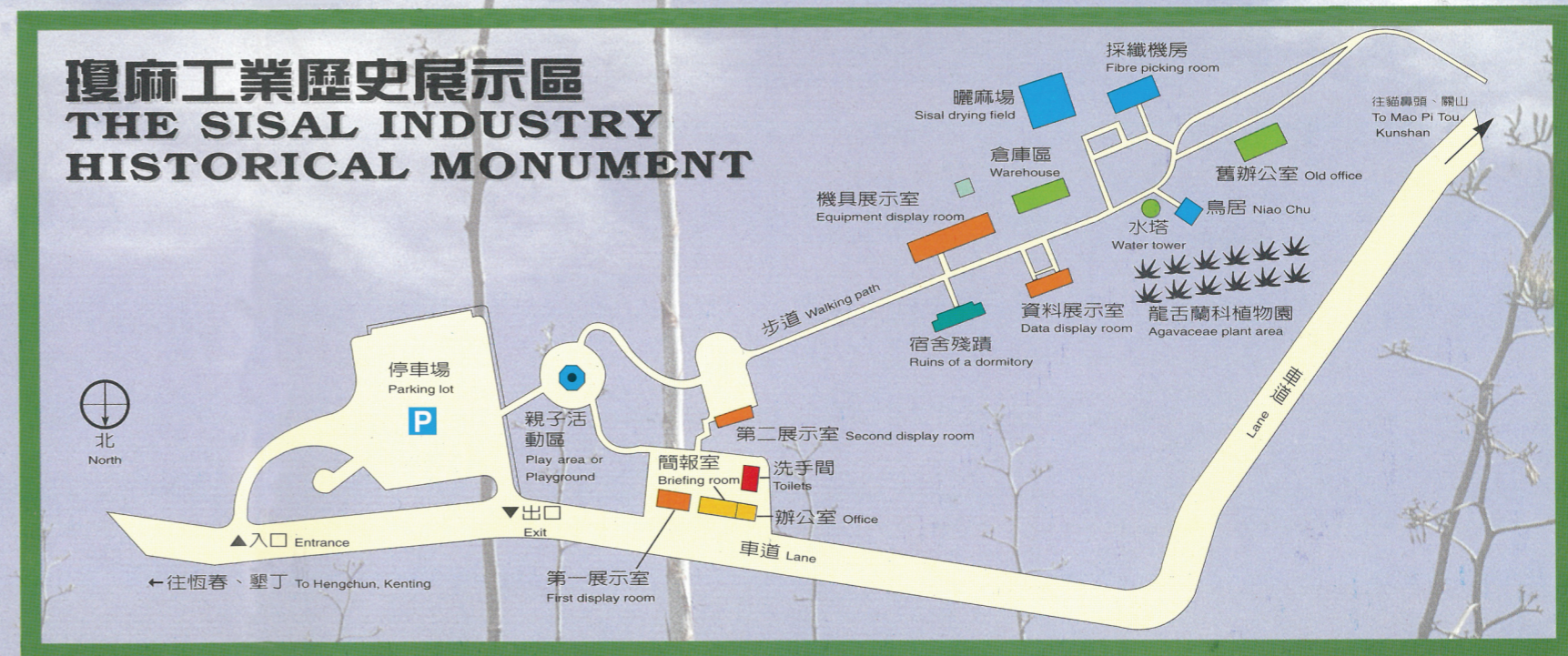
The exhibit was purchased from the Hong Nan Enterprise Co., Ltd. in Hengchun township. The sisal combing machine, baling machine, rope making machine, and packaging machine were brought to the site in 1927. A production flow diagram of the rope making machine is on display.

10. Ruins of a single Dormitory:

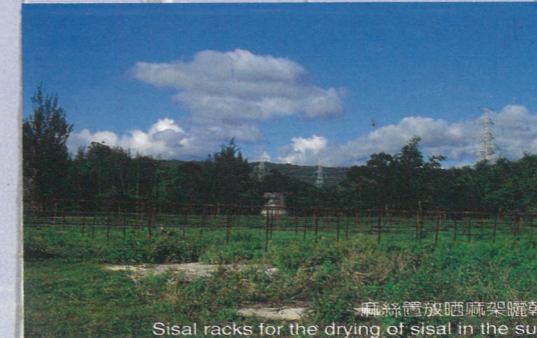
Originally this ruin had been constructed of stone and was the sisal warehouse of the Taiwan Fiber Co., Ltd. After destruction, the Vocational Advisory Committee for Retired Servicemen, Ministry of Executive Yuan, had changed it into a soldier's dormitory in 1966 for the accommodation of 50 soldiers whose main duties were to assist in the fiber production for the demonstration laboratory.

11. Big Water Tower:

Not only supplied water for the use of the employees, but also was the main water source for sisal yarn washing, and was used by the automated fiber production machine. It helped in the automation of the fiber production and washing operation.



自動採織機房 Automatic production room



曬麻架的麻絲 Sisal racks for the drying of sisal in the sun



機具展示室 Equipment display room

■ 結語 CONCLUSION

「瓊麻抽絲起高樓」，一句俗諺道盡瓊麻昔日繁華盛景，榨去葉汁的潔白纖維為恆春居民砌起高樓大廈，而後在新科技的衝擊之下沒入歷史的洪流裏。滿山遍野

的麻田，曾是最典型的恆春半島風光。而今，高瘦的瓊麻花軸纏上夕陽餘暉依稀訴說著瓊麻的滄桑。「恆春瓊麻工業歷史展示區」重現了漸成陳蹟的民生方式，使我

們在瀏覽恆春半島獨特的風土民情之餘，更能從歷史的循環中思考人類在歷史軌跡裏的方位，並且學習悲憫、謙沖的襟懷。

"The sisal agave brings a good fortune for the local people to build a tall building." This is one saying that explains very well about the prosperous history of Sisal in Hengchun, and is the reason for the construction of high buildings there. With the advent of high technology, this period of sisal ended and became part of the historical stream. The mountains full of growing sisal had been part of the scenery of Hengchun

Peninsula. Today, tall and slim unbarvested sisal stalks stand in the sunset, which points to the swift passing of the sisal era. The Sisal Industry Historical Monument displays the old way of life, which lets us review the history of the local people of the Hengchun Peninsula. It makes us think about the place of humans in history as well as to learn with a more humble and sympathetic mind.