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四川桐油之生產與運銷

（中文附英文摘要）

Production and Marketing of Wood Oil in

Szechwan Province, China

(In Chinese With English Summary)

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開 言

四川桐油之生產與運銷

本研究爲洛氏基金會資助農業經濟系研究問題之一，此項研究結果，曾在農業經濟系出版之“經濟通訊”內擇要發表，並曾由朱壽麟君撰著爲碩士論文。民國廿九年秋著者就該論文略加整理，列爲金陵大學農學院研究叢刊之一，當即着手籌印，惜以印刷及經費種種關係，迨民國卅一年春始告付梓。當祈海內賢達，不吝賜教，實深感荷。

本研究由朱壽麟，陳澍生，方星高，羅金榮諸先生負責擔任田間調查工作，潘鴻聲先生亦曾協助指導若干縣份之調查，徐才龍先生對於統計分析諸方面協助甚多，王振權，戴麟，顧佑生，李慶生諸先生對於統計抄寫等工作尤爲盡力，榮惜陰先生負責繪圖工作，楊家騶先生擔任校稿工作，使本研究得早日問世，凡此皆著者所深切感謝者也。

民國三十一年二月孫文郁誌

四川之桐樹

桐樹之品種

桐樹對於自然環境之適應

桐樹之栽培及管理

桐樹之樹齡與產量

四川桐

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PRODUCTION AND MARKETING OF WOOD OIL IN SZECHWAN PROVINCE, CHINA

SUMMARY

In the early years at the beginning of the twentieth century, silk constituted a leading commodity among the various export products of China. During the last twenty years, however, the export of silk from China has slumped greatly and decreased as a result of the keen competition with the products of other countries. During these years the trade in wood oil was rapidly increasing and consequently became the product of first importance in China's export trade. The development of natural resources and gain of foreign exchange has become the essential requirements for long term fighting against the invader since the outbreak of the Sino-Japanese War. Wood oil has become the leading export of the country, as the production areas are chiefly located far behind the fighting lines, and its production and transportation are well maintained by the government, the contribution of wood oil in prolonging the fighting has obviously become more important than ever. After the fall of the cities of Shanghai, Nanking, Hankow and Kwangchow the government still exerted her full powers to promote its production and encourage its exportation. All these measures reflect the importance of the wood oil industry even during the war period. As far as the physical production of wood oil in the country is concerned, Szechwan Province should be recognized as the primary home of the product. It has been estimated that one-third of the nation's total production comes from this particular province. It is for this reason that the Department of Agricultural Economics has launched such a systematic study of both production and marketing of wood oil in Szechwan Province during the period July 1938 to June 1939. The study covered over forty important wood oil producing districts, from which 662 detailed survey schedules were obtained, account books and reference materials were also consulted.

The varieties of wood oil trees in Szechwan Province are recognized by botanical experts as those belonging to Cluster Fruit Type, two varieties, the big kernel and the small kernel; and those belonging to the Single Fruit Type, also two varieties, the persimmon wood oil tree and the woody wood oil tree. In addition, other varieties were discovered but they have not been identified. From the standpoint of the yield of nuts and the oil contents of the nuts, the big kernel and the small kernel varieties are recognized to be better than the others.

The wood oil trees in Szechwan Province are generally considered as wild plants, they grow on waste land and farmers usually give them no care as is usually done for field crops. During recent years, on account of the stimulation of rising prices of the oil, the farmers have increased the plantation of trees rapidly and, consequently, the number of young trees has increased considerably. The present study reveals that young trees, below nine years of age, constitute almost sixtenths of all the trees; while the remainder are adult or old trees. There is a great difference in the yield of oil nuts in an ample year and a lean year. In a year of normal yield the average production of nuts amounts to 2.3 *shih sheng* per tree. If trees that have not reached the flowering stage are excluded, usually up to three years of age, the average yield is nearly three *shih sheng* per tree. Judging from these instances it is quite obvious that the yield per wood oil tree in Szechwan Province is very low.

There are many estimates regarding the volume of production of wood oil in Szechwan Province, but these figures vary greatly one from another. According to the present study, it is carefully estimated that the number of wood oil growers in the province is about one million, seven hundred thousand families; the area covered by the trees amounts to nearly 5,400,000 *shih mow* and the number of the trees, old and young, aggregates approximately 160,000,000. From these trees nearly 3,800,000 *shih tan* of oil nuts and a little over one million *shih* piculs of oil are produced per year. These figures are quite in agreement with the facts in considering the sum of the total export and the total volume of domestic consumption.

The wood oil produced in Szechwan Province is widely known for its superior quality. It can meet all the required physical and chemical standard so it is universally accepted and welcomed by the importing countries.

The wood oil trees are as crops planted by farmers. It is important to recognize clearly the actual conditions of farmers growing wood oil trees and also the effect of the condition of the farmer's families on the yield of wood oil nuts. According to this investigation, most of the farmers who planted the trees are owner farmers in mountain areas. Almost no wood oil trees are planted on the plain and more fertile regions. Approximately, one-fifth of the farm area in the districts where wood oil is produced, is occupied by wood oil trees. On an average, each family planted one hundred wood oil trees, from which about 2.5 *shih tan* of nuts were produced. The nut may be considered as the important by-product of the farmers. The cost of production of the nut amounted to 7.19 *yuan* per *shih tan*, of which 1.13 *yuan* was realized in cash and the rest, or 80 per cent of the total expenditure, as a non-cash receipt. In the unit cost of the nuts, 60 per cent was for the use of land and 30 per cent for wages. During the period of this study the price per *shih tan* of nuts was 3.91 *yuan*. In reckoning the unit cost, the growers met a

loss of 3.28 *yuan* per *shih tan*; considering the cash expense only, they might gain a profit of 2.78 *yuan*. Of the nuts harvested by the farmers, nearly one-half were directly sold, one-third were used for exchange for vegetable oil from local pressing houses, and the remainder, for other uses.

The pressing house which serves as a processing agent, collected harvested nuts in the neighboring villages for pressing oil. The method of pressing usually has a direct affect on the quality of oil pressed. During the year of this study, the average facility of each pressing house itself, accounted for 270 *yuan* in value. The average quantity of the nuts purchased by each pressing house represented nearly 250 *shih tan*, which amounted to a little over 900 *yuan* in value and produced about 70 *shih* piculs of oil. In addition approximately 70 *shih tan* of the nuts from which 20 *shih* piculs of oil might be produced, was consigned from consumers for pressing. The average volume of wood oil produced per *shih tan* of nuts amounted to 25 *shih* catties. The total cost of pressing for one *shih* picul of oil was 3.51 *yuan* on an average. Of this cost, expenditures for fuel, labor and food were the greatest. There is a close relationship between expenditure for pressing and the size of the pressing machine. According to this study, when the volume of oil pressed per operation was below 60 *shih* catties, the cost of pressing for one *shih* picul of oil amounted to 6.81 *yuan*; while if the volume of oil was more than 100 *shih* catties, the cost represented only 2.6 *yuan*. Hence the larger the capacity of the machine, the smaller the unit cost for pressing. The oil pressed by the pressing house was sold or exchanged with farmers for wood oil nuts or other vegetable oil seed. The unit cost of producing one *shih* picul of wood oil in the pressing house was 18.96 *yuan*. The receipt per *shih* picul of oil and oil cake accounted for 22.64 *yuan*. Thus, a net profit of 3.68 *yuan* could be aggregated for one *shih* picul of oil. The net profit for each pressing house represented approximately 230 *yuan* per year, which was only 30 *yuan* less than the total value of facility made by the house itself.

Due to the poor condition of communication in Szechwan Province, the methods for packing and transporting wood oil are very expensive. The main equipment for packing was bamboo-baskets and wooden casks. Occasionally iron casks had been used for export in recent years. It is generally recognized that the leakage and absorption of oil in baskets and wooden casks account for heavy losses during transporting. Usually there is also leakage in the iron casks and these were very difficult to repair with glue or other materials. As a result, of the high depreciational cost of the containers the unit cost of package became very high. According to this study, in all reports collected, the percentage of the leakage indicated in different containers was 97 per cent for bamboo baskets, 81 per cent for wooden casks and 20 per cent for iron casks. The volume of oil absorbed by each container during one journey was

2.5 *shih* catties for bamboo baskets and 3.4 *shih* catties for wooden casks. The depreciation in value of the container per *shih* picul of oil for the same time, was 0.30 *yuan* for bamboo baskets; 0.03 *yuan* for wooden casks and 0.55 *yuan* for iron casks. It is, therefore, necessary to improve the method of packing.

With respect to the method of transporting within the province, porters and ships are the most important agents for transportation. But a great deal of difference in speed and expenditure is indicated between them. When transported by porter one and a half days and 0.93 *yuan* were required for a distance of 100 *li*, while shipping for the same distance approximately, one day and 0.58 *yuan* should be required. Hence, transportation by ship was relatively cheap and quick as compared with that by porters. Before the Sino-Japanese war, wood oil in the province was transported to Hankow and Shanghai for export by steamers. But the line of export has been changed during the war, the oil was transported to Kunming for export by three different ways; (1) from Chungking to Kunming through Kweiyang, (2) from Luhsien to Kunming through Pichieh, and (3) from Ipin to Kunming through Shatung. The former two routes were by highway, and the latter, by an old trade road. At present, the highway from Ipin to Kunming is usually used for the transportation of wood oil. In general, the transportation on all lines has given low efficiency and high expenditures. To export wood oil during the war we need to establish a desirable and efficient international line of communication.

Owing to the weakness of capital collected by the middlemen and stores in the wood oil market, the volume of business in Szechwan was relatively small. The kinds of middlemen in the market may be divided into, local buyers, purchasing agents, oil stores, brokers, oil houses, and export companies. The local buyers, purchasing agents and oil stores are engaged in collecting and purchasing wood oil directly from the growers in villages. The function of brokers is to introduce the trade of oil, while the oil house serves as the collecting agent between oil stores and export companies. Through the complex system of middlemen in the market the management and operation of the wood oil business has become uneconomical and expensive. When classified by the character of their operations, the middlemen in the marketing of wood oil may be divided into retailers, wholesale receivers and wholesale exporters. The profit gained by retailers was 2.46 *yuan* per *shih* picul of oil handled which amounted to 12 per cent of its cost. But the wholesale receiver met a loss of 0.77 *yuan* for the same unit of oil, which amounted to 3.9 per cent of its cost. The impossibility to export oil and a consequent decline in prices were the reasons why the wholesale receivers experienced this loss. It was unfortunate that because of the violent Japanese bombing of Chungking

and Wanhsien, no material could be collected in respect of the profit and loss conditions of the wholesale exporters. The organization of the wood oil market in the present province indicated much complication with many divisions such as primary, secondary, middle, exporting, etc. All these should increase the cost in marketing because for each step of trade there must be some increase in expenditures. Chungking and Wanhsien have been considered the greatest markets of wood oil in Szechwan Province. The volume of export of wood oil from each of these two markets accounted for nearly three hundred thousand *shin* piculs in 1937. The Temporary Regulations for the control in the wood oil business, proclaimed by the Provincial Government of Szechwan in 1939, show that Chungking, Wanhsien, Ipin and Luhsien were considered to be the main export ports. Among them, the importance in marketing varied largely. Nanchung, Hochwan and Fuling were regarded as the larger centralized markets within the province.

All growers and operators engaged in the wood oil business must pay much attention to fluctuation in prices. In general, the price of wood oil varied in close relation with the purchasing power of money and the condition of supply and demand for the oil. This realized an unfavorable state of affairs for the fluctuation in prices had led the growers, pressing houses, and middlemen of wood oil to attempt to speculate. Before the war the price of oil varied from time to time and had reached the peak in 1936. In 1937 as the war had brought about disturbances in export, the price of oil declined rapidly, while, due to the decreasing value of money in 1940, the price of oil rose again. An obvious seasonal variation is indicated in the price of wood oil. In general, prices in May and June are the highest and with an index number of around 118 while that in December and January is relatively low and the index varies from 70 to 80. How to reduce and adjust the violent seasonal variation in the price of wood oil, however, was one of the questions considered. Surely, the variation in prices has a great influence on the number of wood oil trees planted by farmers.

After the fall of the important ports and cities of export, much trouble was met in the exportation of wood oil. Consequently, the price of oil fell rapidly. But the export of oil became most important and necessary for the gaining of foreign exchange. For the purpose of encouraging the export of oil, the Foreign Trade Commission of the Ministry of Finance has advanced credit to the export merchants and is prepared to sell the foreign exchange gained to the Central Bank of China. For strengthening the control of wood oil trade, the Provincial Government of Szechwan proclaimed a Temporary Regulations for the control of wood oil business and set its price in different localities. Some public warehouses for the centralization and collection of wood oil have been established in several cities. The Szechwan Wood Oil Trade Company

has been appointed by the Foreign Trade Commission as an agent to purchase wood oil at the price determined by the government. Because of the extremely low standard and the impossibility of fluctuation in the price determined by the government, the volume of oil purchased by the Company was extremely small and far below what had been estimated. On that account it became necessary to consider and improve technically the price of oil determined by the government.

Through the previous statement, it is seen that growers, pressing houses, package, transportation, stores, markets, prices, trades and management are very important in the wood oil business and some improvements both economical and technical, are urgently required. This study attempts to give the facts, but some suggestions for improvements have been briefly considered. It still remains for the reader to find the solution for the questions of improving and furthering the wood oil trade in this province.

四川桐油之生產與運銷

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四川桐油之生產與運銷

提要

中國輸出產品中，原以蠶絲爲大宗，但在近十數年來，因國際間激烈競爭之結果，致中國蠶絲之出口，一蹶而不易振，而在此時期中，桐油之出口數量，則日見增加，結果桐油遂爲中國目前首要之輸出品，自抗戰發動後，國內資源之開發，國外外匯之換取，爲長期抗戰應具之條件，桐油以居出口產品之首位，且產區又遠在後方，非敵人所得而摧毀，故桐油對於吾國抗戰資力之關係，亦日形重要。自京滬淪陷，粵漢失守，出口路線，大受打擊，政府於萬分困難之下，尤出全力以謀桐油事業之發展，桐油產品之輸出，桐油之重要，於此當可想見。惟中國桐油之產區，以四川著稱，蓋四川一省之產品，即當全國總產額三分之一也，故於民國二十七年秋季至二十八年夏間，作全川桐油生產運銷之調查，計歷四十餘縣，共得各種記載詳盡之調查表格六六二份，並其他各種報告，文獻，地圖等多件，經加整理分析後，編述爲十章，並以統計所得各縣之詳細數字，列於篇後之附錄內，藉供關心川省桐油事業者之參考焉。

四川桐樹品種之已經專家鑑定者，屬於叢果種者，有大米桐，小米桐二種，屬於單果種者，有柿餅桐，柴桐二種，其他未曾經人鑑別之品種，調查時亦每有發現。自桐樹之產量與桐米之含油量等觀點而論，大小米桐當爲比較優良之品種。四川桐樹，皆爲山野散生之植物，不似稻麥等作物之爲農人愛護培養者可比，惟近年以來，以桐油價格上漲之關係，農人亦競相植桐，故目前幼年之桐樹爲數頗多，在調查期內，幼年桐樹幾佔十分之六，其餘則爲壯年以及老年之桐樹。桐樹之產米量，豐歉年份之差別甚大，通常每株平均約產桐米二三市升，若將三年以下尚未開花之桐樹除外計算時，每株約產桐米三市升，由是可知四川桐樹每株之產量，並不爲高也。

關於四川桐油之統計，歷來估計甚多，高下頗不一致，據吾人估計，全川植桐之農家約一百七十餘萬戶，桐地面積約五百四十餘萬市畝，大小桐樹約一萬六千餘萬株，年產桐米約三百八十餘萬市石，桐油約一百餘萬市担，此數證之近日出口以及內銷之數量，頗相符合也。四川桐油之品質，素以優良著稱，無論自物理或化學方面之分析而論，皆能適合出口之標準。而爲各國所歡迎也。

桐樹爲農家栽植之作物，故植桐農家之實況，並其對於桐米產量之影響等，必

須有所明確之認識也。據調查所得，桐農大多為山區之自耕農，平坦肥沃之區域，幾無桐樹之種植，桐樹面積，約佔植桐區域內桐農田場面積之五分之一，每家平均植桐約一百餘株，約能產桐米二·五市石，故當為桐農重要之副產品。桐米生產之成本，每市石平均為七·一九元，其中關於土地之使用費約佔總成本十之六，人工費佔十之三。在此七·一九元之成本中，現金之支出為一·一三元，其餘為非現金支出，約佔全支出十之八。在調查時每市石桐米價格為三·九一元，故以成本計算，桐農每市石須虧折三·二八元，惟祇以現金之支出計算時，則尚可盈二·七八元也。桐農出售之桐米，約佔全產額之半，三分之一之桐米，乃作自榨坊換取植物油料之用，其餘則自行榨油或有時作其他之用途。

榨坊聚集其鄰近鄉間之桐米，榨製成桐油，為桐油之加工製造者，故榨油方法之良否，與桐油品質之優劣甚有關係也。榨坊自有設備之總值，在調查週年內，平均每家約為二百七十餘元，每榨坊平均購入桐米量，約為二百五十市石，約值九百餘元，計可得油約七十市担，此外並接受顧客委託代榨之桐米約七十市担，得油約二十市担，故平均每市石桐米約能榨桐油二十五市斤，在榨油之開支中，以燃料，人工，伙食三項為最大，榨油費用總計每市担平均為三·五一元，惟此項費用之多寡，與榨機大小有密切之關係，據調查每榨之出油量在六十市斤以下者，每市担桐油之榨費為六·八一元，每榨出油在一百市斤以上者，每市担僅二·六〇元，二者相差甚多，可知大榨遠較小榨為有利。榨坊榨成桐油後，即以之出售，或與農人交換桐米或其他植物油籽，榨坊每市担桐油之生產成本平均為一八·九六元，每市担桐油以及其所產桐餅之收入為二二·六四元，故榨製每市担桐油約可盈餘三·六八元，以每榨坊計，因經營桐油而得之純利，年約二百三十元左右，較其自有設備之總值，僅少三十元耳。

桐油之包裝及運輸方法，以受四川交通設備落後之影響，頗不經濟。包裝之工具，大部為竹篾木桶之屬，近來兼用洋鐵桶以為裝運出口之用者，竹篾與木桶因滲漏及吸油之損失，甚為可觀，且為極普通之現象，洋鐵桶亦有滲漏，滲漏後且不易糊補，而各種包裝工具之折舊甚大，凡此皆足以增加包裝之成本。據調查各地竹篾有滲漏之報告者為百分之九七，木桶為百分之八一，洋鐵桶為百分之二〇，各包裝工具每次每件之吸油量，竹篾為二·五市斤，木桶為三·四市斤，而使用各種包裝工具每市担一次之折舊費，竹篾為〇·三〇元，木桶為〇·〇八元，洋鐵桶為〇·五五元，故包裝方法，確有改良之必要。運輸方法桐油有省內集中者，或為挑負，或為船載，惟二者之遲速貴賤頗有差別，陸路挑負，每百里須一日半之時間，水運則尚不及一日，運費每百里陸運為〇·九三元，水運為〇·五八元，可知水運較為快捷省費也。

在戰事未發生前，桐油出口，藉輪船運至申漢，抗戰期間，改由昆明出口，其路線有三，一由重慶經貴陽至昆明，一由瀘縣經畢節等地至昆明，一由宜賓經昭通至昆明，前二者爲公路，後者爲舊時驛道，目前多採取由瀘縣之公路至昆明。惟各線運輸能力，皆極薄弱，而成本則甚高，故就桐油而論，在此抗戰時期，亟需建立一健全之國際路線。

四川桐油之市場，以經營桐油業商號資力薄弱之故，多爲小量之交易，經營桐油業者，約可分爲挑販，莊客，油舖，經紀人，油莊，出口行等。挑販，莊客，油舖收聚鄉間之桐油，經紀人介紹買賣，油莊爲油舖與出口行之中間收集桐油者，觀各級商販類別之多，即可知其經營之不經濟矣。各種桐油商號依其業務之性質，可分爲零售，收零成整，與收整外運等三種，零售桐油商號經營每市担之純益爲二·四六元，約爲其成本之百分之一二，收零成整之商販，經營每市担之純損爲〇·七七元，約爲其成本之百分之三·九，其所以虧損者，緣於當時油價因不能出口而暴跌之故。收整外運之商號以調查時敵機在渝萬二地轟炸甚烈，無法調查，故其盈虧之情形不詳。四川桐油市場之組織，層數極多，有初級，次級，中級，出口等市場，且殊不經濟，蓋多一次交易，即多一次開支費用也。桐油市場之較大者，爲重慶，萬縣二地，一九三七年約各輸出三十萬市担，二十八年四川省政府公佈之桐油貿易管理暫行辦法大綱中，規定渝萬敘瀘四處爲輸出口岸，但其重要之程度，相差甚大。至內地集中市場之較大者，有南充，合川，涪陵等三地。

桐油價格之漲跌爲一般植桐農人及其他所有經營桐油業務者所最關心之事，大體而論，桐油價格因供求以及貨幣購買力之關係，漲跌不定，此對於桐農，榨坊，以及桐油商人等皆存一種投機之印象，似非謀求永久發展桐油事業之所應有。抗戰以前，桐油價格，時漲時跌，至一九三六年曾達最高峯，迨一九三七年抗戰發生，桐油因無法外運而價格日落，至一九四〇年因幣值跌落過甚而又上漲。桐油價格有顯著之季節變動，大致以五六月中爲最高，指數達一一八左右，以十二月與一月爲最低，指數僅七八十左右，故如何爲適當之調劑，以使此價格之季節變動差異減少，亦當加以討論者。又桐油價格之變動，對桐農之種植桐樹亦顯發生相當之影響也。

自輸出港埠失守，出口路線大受打擊，內地油價大跌，而桐油又需亟亟運出，以謀換取外匯，貿易委員會曾一度墊付款項協助商人出口，並結售外匯於中央銀行。後以加強管理起見，由四川省政府公佈，四川桐油貿易管理暫行辦法大綱，並規定各地桐油官價，在各地籌組桐油公棧，以公棧爲集中交易之場所，由貿易委員會指定之收購機關——四川桐油貿易公司——依官價收購，辦理以來，收購之數量極少，成績殊難令人滿意，此蓋由於官價訂定太低，且一經訂定，不能隨市價漲落，而各

地官價訂定之多少，在技術上亦頗有可加以商榷之餘地。

綜上所述，四川桐油之整頓事業如桐農，榨坊，包裝，運輸，以及商店，市場，價格，貿易，管理等等，在在皆有應加商榷或改善之處，本篇於盡量表現事實之外，對於改進商榷諸點，雖亦時時提及，然未多所發揮，四川桐油事業問題之究宜如何解決，惟在讀者之善自期會耳。