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HEMP FIBER PRODUCTION

By Lyster H. Dewey, Senior Botanist in Charge of Fiber Plant Investigations, and Andrew H. Wright, Agent, Fiber Plant Investigations, Bureau of Plant Industry, United States Department of Agriculture.

Hemp is grown in but a few localities in the United States. Since 1925 the crop has been produced only in Wisconsin, Kentucky and Illinois.

During the past 100 years, hemp has been cultivated successfully in several states, including New York, Kentucky, Missouri, Ohio, Michigan, Illinois, Indiana, Iowa, Minnesota, Wisconsin and California.

From about 1850 to 1915, practically all hemp grown in the United States was produced in "central" Kentucky. Since 1915 hemp growing was largely shifted to Wisconsin. Kentucky practically discontinued the crop. Since 1930 very little hemp has been grown anywhere in the United States.

Hemp is a fiber crop. The fiber is obtained from the stems (stalks) of the hemp plant, Cannabis sativa. To get the fiber out, the stalks must be partially rotted (retted) and then put through machines which separate the fiber from other tissues of the stalks.

A dense stand of tall, slender stalks is needed to produce a good yield of fiber. Thus to grow a satisfactory crop of hemp requires very rich soil and a good supply of moisture throughout the growing season.

Conditions of soil and climate in many sections of the United States are well suited for growing hemp. This has been thoroughly established by many years of experience. The hemp problem in recent years is not in growing the crop and preparing the fiber, but in obtaining a satisfactory market.

While at one time or another hemp fiber has been used for many purposes in the United States, yet since about 1920 its use has been limited to a few so-called specialties, such as cores for wire rope, marine lines and yarns, upholsterer's twines and high grade wrapping twines. A little has been used for casks (packing) and some for mixing with weaker fibers.

During the past half century, except for a few years during the "world war period", American hemp has been unable to withstand the competition of other fibers. The principal replacing fiber has been jute, though directly or indirectly the market for hemp has been greatly affected by cotton, and the hard fibers sisal, henequén, and abacá (Manila hemp).

The decrease in the use of hemp in the United States applies not only to American hemp, but to all hemp, regardless of the source of production. While much hemp is produced in such foreign countries as the Soviet Republic, Italy, Yugoslavia, Roumania, and Poland, yet none of consequence is brought into the United States from these countries. Thus the difficulty in obtaining a market for American grown hemp is not because of competition with foreign hemp production, but because of competition with fibers other than hemp.

Hemp Production for Last 58 Years

The following table of production of hemp in the United States and importations gives approximate figures only, and round numbers.

Table 1. Hemp Production in United States and Imports of Hemp Fiber 1876 to 1933 by yearly average for 5 year periods.

Period	Acres Grown in United States	Tons of Fiber Produced in U.S.	Hemp Fiber Imported, Tons.
1876 - 1880	15,000	7,000	
1881 - 1885	11,000	5,000	
1886 - 1890	16,000	7,500	
1891 - 1895	11,000	5,000	*4,500
1896 - 1900	10,000	4,500	5,000
1901 - 1905	12,000	5,500	5,000
1906 - 1910	10,000	4,500	6,000
1911 - 1913	10,000	4,500	6,000
1914 - 1918	19,500	8,500	5,000
1919 - 1923	8,600	3,800	4,000
1924 - 1928	4,300	1,800	2,000
1929 - 1933	1,200	500	1,000

*Hemp importations not recorded separately previous to 1890.

Hemp Prices for Last 20 Years

The record of prices obtained for American hemp since 1914 is fairly complete, yet the actual average price obtained for all grades during any year can be approximated only. Table 2, which follows, is based on prices obtained for American hemp line of average quality. Other grades of hemp, such as poor line and tow are not included.

Table 2. Approximate Average Yearly Prices Obtained for American Line Hemp from 1914 to 1933 inclusive.

Year	Line Hemp Cents a Pound	Year	Line Hemp Cents a Pound
1914	12.50	1924	14.00
1915	13.50	1925	18.00
1916	14.00	1926	13.00
1917	15.00	1927	12.00
1918	18.00	1928	11.00
1919	22.00	1929	15.00
1920	19.00	1930	11.00
1921	12.00	1931	10.50
1922	11.00	1932	10.00
1923	11.00	1933	9.00

Hemp Yields Fall on Fertile Soils

In sections which have fertile soils and sufficient rainfall throughout the growing season, hemp yields well. On suitable soils in Kentucky, Illinois and Wisconsin, hemp has rarely failed to produce a good crop. Yields have usually ranged from 750 to 900 pounds of fiber per acre. The yield of dry hemp stalks, as cured in the shock, is about 5 tons per acre, or of dry stalks after dew-retting, about 3 tons per acre.

Farmers, who have had experience with hemp, like the crop because it assists in controlling weeds, leaves the soil in excellent condition for succeeding crops and is not noticeably "hard on the land".

There are also things about hemp which farmers dislike. The entire crop is removed from the farm, thus no straw, roughage, bedding or manure

is obtained as a by-product. Also the cash outlay is rather large. The acre cost for seed is rather high and the rental for harvesting machinery is considerable.

Special Harvesting and Milling Machinery Necessary

It is useless to grow hemp unless full equipment for harvesting and milling are provided. Such equipment is expensive and requires experience to operate. Unless there is a hemp mill within hauling distance the crop cannot be marketed.

One mill can handle around 700 acres of hemp, and one harvesting machine can take care of about 100 acres.

Fertile Soil Necessary

There is no use in attempting to grow hemp except on rich soil. Good silt loams are necessary. In the fertile soil areas where the crop is grown, it is the custom to select the best land on the farm for hemp. The soil must be rich in organic matter, well supplied with manure, and thoroughly drained.

Hemp on Marsh Soils

The general experience with hemp on marsh soils in the United States has not been satisfactory. Some marshes produce a very rank growth; others produce a very short growth. Where a rank growth is obtained, the yield of stalks is high, but the quality of the fiber is so poor that it is practically worthless for spinning. Where a short growth is obtained, there is some evidence that the difficulty can be corrected by the use of commercial fertilizers. Potash is generally necessary, though both phosphorus and potassium may be required. Usually it is best to avoid marsh soil in growing hemp.

Hemp Assists in Killing Weeds

Hemp is the best crop we have for smothering weeds, yet weed infested soil must be properly prepared in order to give the hemp a chance.

The impression is entirely too common that quack grass and Canada Thistle lands can be cleaned by seeding them to hemp after ordinary preparation. This cannot be done. Such lands must be first thoroughly worked to subdue the weeds. Any method that will do this is satisfactory. If the land is not fertile, it should be given a heavy application of manure in the fall. Early in the spring, the soil should be worked up thoroughly and kept worked to the very time the hemp is seeded. If the weeds are well subdued and kept under control until the hemp is planted, good results will be obtained, otherwise the weeds are very liable to choke out the hemp.

No Danger From Hemp as a Weed

Hemp is an annual plant and will not become troublesome as a weed. It is easy to eradicate. The seeds are not long lived, and there are no underground roots or stems which live over from one year to another. Hemp has not been found troublesome as a weed in any section of this country. Notions to the contrary are entirely unfounded.

Hemp Does not Exhaust the Soil

Hemp removes about the same amount of fertility from the soil as does a good crop of corn. Because it grows rank and luxuriant, it is often incorrectly contended that it is "hard on the land". Hemp requires a fertile soil for its profitable growth, but this does not mean that it exhausts fertility, for when retted on the land where it grows, as is the

custom in the United States, much of the soluble plant food elements are returned to the soil. Farmers, who have grown hemp for many years, unanimously agree that it is a very satisfactory crop so far as the soil is concerned; that it greatly assists in getting rid of weeds and leaves the soil in an excellent condition for succeeding crops.

Hemp Crop Should be Rotated

Hemp should not be grown continuously on the same soil for the same reason that corn or grain should not be so grown. It does best after corn, alfalfa or clover. It does not follow small grain or timothy satisfactorily, but may do well on good bluegrass sod fall-plowed. The usual practice is to plant the hemp after corn, follow with a small grain seeded down to clover, then follow the clover with corn. The manure may be put on the clover seed in the fall preceding the corn.

On very fertile soils that are badly infested with weeds, hemp is occasionally grown two years in succession. When the object is to thoroughly rid the land of weeds and to lower the available nitrogen so that grain will not lodge, the practice of growing the crop two years is a good one. This cannot be done, however, except on soils that are unquestionably rich.

Commercial Fertilizers Useful

Information available indicates that commercial fertilizers may be used to advantage on soils that are not well supplied with manure. Ordinarily, the best fertilizer for hemp is barnyard manure, but it is evident that commercial fertilizer can be used to advantage to supplement manure. So far as is known, a complete fertilizer, one contain-

ing nitrogen, phosphorus, and potassium, is most likely to give the best results. A truck crop fertilizer such as that used for potatoes or sugar beets is probably the best in most cases, such as a 5-8-7, or a 4-8-6. The usual amount is around 300 pounds an acre. The use of 300 to 400 pounds an acre of superphosphate alone has also given good results on typical black prairie soils. Experience indicates that it is unwise to depend upon commercial fertilizer to offset lack of manure or natural fertility. On soils which will not grow hemp without using commercial fertilizer, it is probably best not to attempt the crop. On acid soils, lime at 3 to 4 tons an acre may be applied to advantage.

Thorough Preparation of Soil Necessary

A good seed bed is particularly necessary for hemp. Both fall and spring plowing has been found satisfactory, but as a usual thing, fall plowing seems to be best. The soil should be worked up thoroughly before planting, but should be firm. A corrugated roller used just before and just after seeding, will do much to put the seed bed in proper condition.

Early Seeding Usually Best

Results from seeding at different times vary in different seasons, but in the majority of years, early seeding is more satisfactory. Hemp may be planted a little earlier than corn. Some plant it practically as early as oats. The usual practice is to seed it just after the oats are planted and before corn planting starts.

Either Broadcast or Drill

Good stands have been obtained by using either a broadcast seeder or

a grain drill. The tendency, however, is toward using the drill instead of the broadcaster. If a corrugated roller is used after broadcasting, practically as good stands are obtained as with a drill. On soils which have a high proportion of clay and which are inclined to crust, broadcasting frequently gives better results. On all friable loam soils, drilling is probably the best method. A four-inch drill is decidedly preferable to a six-inch; an eight-inch drill should not be used. Hemp seeds should be covered not more than one inch deep.

Rate of Seeding

On average hemp soils, from four to five pecks of good seed to the acre seems to give the best results. On excessively fertile soils, five pecks are advisable. On soils less fertile than the average, four pecks are sufficient. Experience indicates that less than four pecks is rarely advisable on any soil. Hemp seed weighs 44 pounds to the bushel, or 11 pounds to the peck. On average soils, therefore, 44 to 55 pounds to the acre is needed. On less fertile soils, 44 pounds, and on very fertile soils 55 pounds are suggested.

Harvest When in Full Blossom

Hemp should be harvested when the pollen bearing plants are in full bloom. At this stage, the lower leaves have mostly fallen and the leaves below the top are usually yellowing. Generally, hemp harvested early, has the best season for retting, consequently it is better to harvest a little on the early side than to wait until it is too mature. So far as the quality and yield of fiber are concerned, it appears that

the crop may be harvested any time between blossoming and the first formation of seed. This means that there is a period of fully three weeks during which the crop may be harvested. Over-ripe hemp does not ret well and it produces a harsh fiber.

Harvest With Reaper or Spreader

Hemp must be harvested with machines designed for the purpose. In very small fields, the self-rake reaper is used to advantage. Fields of five acres or more are harvested with a special hemp harvester. This machine has been used for many years and is now standard equipment in hemp producing sections. It harvests the hemp and spreads it in one operation, thus doing away with hand labor. The hemp harvester operated by a tractor will harvest from five to ten acres a day.

Proper Retting Very Important

The retting of the hemp straw is the most important item in handling the crop, for the kind of retting obtained determines the quality and value of the fiber. The green stalks, after they are spread on the stubble, are allowed to remain there until they have been sufficiently decomposed so that the bark can be readily separated from the stems. The time varies according to weather conditions. If warm, moist weather occurs just after the crop is spread, retting will be very rapid and may be complete in two or three weeks. If it is dry and cool, retting may be delayed until very late in the fall. Usually the early fall is moist and warm, consequently early harvesting has a distinct advantage. In unfavorable retting seasons, there is a tendency to lift the hemp before it is retted. This should not be done. The hemp should be left spread out in the field until the bark can

be readily removed. It is better to leave the crop in the field even though it becomes covered with snow than to take it up when it is under-retted.

Retted Straw Bound, Shocked, and Stacked

When the hemp straw is properly retted, it is lifted and bound in bundles. This is done either by hand or with a special hemp binder. When labor is plentiful, binding by hand is a common practice; otherwise the machine binder is used. This machine has been carefully developed and is used wherever hemp is grown to any considerable extent.

The bound bundles are placed in shocks a little larger than those used for corn. When the bundles are well cured they may be either stacked on the farm or hauled to the hemp mill and stacked there. Some retting takes place in the stack and usually the fiber is more easily separated and cleaned after the straw has been in the stack a month or more.

Great care should be exercised in building stacks. They should be so constructed that each layer of bundles has a very pronounced pitch. The center should always be kept high. In lapping, but little of the butts of each layer should be exposed to the weather, as exposed parts will decompose if left long in the stack. There is too much careless stacking both on the farms and at the mills. Too much is invested in the retted straw to stack it carelessly. A little time devoted to careful stacking will remove a source of considerable loss to both hemp grower and miller.

When the retted hemp is delivered at the mill, the farmer's part of the work is completed.

Fiber Separated and Prepared in Mills

At the hemp mill the retted straw is put through a long dry kiln. This removes practically all of the moisture. The dried straw is then thoroughly crushed by a machine known as a "hemp brake". After the straw is crushed, the broken material is brushed and cleaned. This process is known as "scutching", and the machine on which the work is done is known as a "hemp scatcher". The long fiber as it comes from the scatcher, is twisted into hands, graded, and baled. This long, straight fiber is known as "line".

In scutching the hemp, a part of the fiber is brushed out with the woody portion of the plant. This part of the fiber is short, tangled, and snarled, and is known as "tow". Tow is also produced by short or tangled stalks. The tow is cleaned and prepared for baling in a special tow machine. The tow is not twisted into hands, but is baled in the form in which it comes from the machine.

Hemp Not a Perishable Crop

Hemp has a distinct advantage over many crop products in that it is not readily damaged and may be held for a long time either in the straw, or in the fiber. Hemp straw properly stacked, may be held for many months with very little loss. Baled hemp may be kept for several years without damage, provided it is properly stored.

Uses of Hemp Fiber

The principal purposes for which American hemp has been used are: (1) Commercial twines; (2) thread for sewing leather goods; (3) tarred marine ropes and lines; (4) oakum for packing. Contrary to common opinion, hemp is

not used for making binder twine, neither is it used for coarse ropes.

"Commercial twines" is a rather indefinite term used to include a wide range of twines used for various purposes, such as upholsterers' twine, ham string, belt cord, sail threads, and to some extent, high quality wrapping twines.

Threads made from hemp were used principally for sewing brooms and brushes; in the manufacture of such leather goods as shoes, harness, bags, pocket books, and leather clothing. These threads were often made from a mixture of hemp and flax fiber, although hemp alone has been used.

Marine cordage is manufactured to a very limited extent from hemp. However, considerable quantities of such marine products as houseline, for tying up awnings and general purposes, marline for binding the ends of ropes, and ratline for the steps in the shrouds, are made from hemp.

Some oakum is still made from the cheaper grades of hemp tow. There are two principal kinds, marine oakum and plumbers oakum. Marine oakum is used for calking ships, scows and small boats. Plumbers oakum is used for packing all kinds of pipes, such as spigot, steam, water supply, waste, sewer, and gas.