

## Agrotechnology of hemp cultivation and the process of fiber extraction

M.K.Urozov

U.Barotova

M.Fayziyeva

Termez State University of Engineering and Agrotechnologies

**Abstract:** *This article provides information about the agrotechnology of hemp, the process of obtaining fiber from hemp, and the areas of application of the fiber. Hemp fiber is very strong and resistant to continuous use, which allows it to be used in the production of various products, such as fabrics, threads, and paper. Several varieties of hemp are also being grown and experiments are being conducted in our republic.*

**Keywords:** *hemp, fiber, agrotechnology, hemp stem, irrigation, fiber cultivation technology, hemp fiber, epidermis, collenchyma and fiber bundles*

### Introduction

According to the Presidential Decree of the Republic of Uzbekistan No. PF-60 dated January 28, 2022, "On the Development Strategy of New Uzbekistan for 2022-2026," one of the key tasks set forth is "to ensure the stability of the national economy and to continue the industrial policy aimed at increasing the share of industry in the gross domestic product by 1.4 times..." In the implementation of these tasks, doubling the production of textile industry products has become of crucial importance. In our country, as in leading global economies, fiber crops are highly valued for their economic and strategic significance. Special attention is paid to the cultivation of fiber plants in the national agricultural policy. In recent years, the Uzbek government has adopted several regulatory and legal documents aimed at accelerating the cultivation of technical crops, diversifying the agrarian sector, and ensuring the sustainable development of the textile industry. These measures serve to enhance the country's potential for producing high value-added goods.

In Uzbekistan, along with cotton and flax, hemp is also cultivated for the production of coarse fiber, and its cultivation technology has been developed scientifically over many years. Extracting fiber from hemp grown in the Surkhandarya region has become one of the most pressing issues today, since hemp is cultivated in only a few regions of Uzbekistan. Hemp fiber is extremely strong and resistant to continuous use, which makes it suitable for various products such as fabrics, threads, and paper. Hemp fiber is a long fiber obtained from the stalk of the hemp plant. It is thin, soft, durable, and has high hygroscopic properties. Hemp is considered environmentally sustainable because it requires little energy and grows rapidly. This makes it a popular eco-friendly raw material. Since hemp is cultivated in Uzbekistan, its fiber is classified as a local raw material. Hemp fiber absorbs moisture well and allows air circulation, making it suitable for clothing and other products. Because hemp grows quickly and produces a large amount of fiber, its production can be economically efficient.

The hemp stalk is covered with a cuticular epidermis on the outside. Beneath the epidermis lies a mechanical tissue - three layers of collenchyma. Following the collenchyma is a multilayered parenchyma layer, in which bundles of fibers are arranged in long, ring-like shapes. The epidermis, collenchyma, and the fiber bundles in the parenchyma together form the bark of the hemp stalk, which is referred to as "lub" in production.

Hemp is a moisture-, heat-, and light-loving short-day plant. Its transpiration coefficient is between 580 and 700 units. Hemp is thermophilic, and its seeds begin to germinate at a temperature of 10-12°C, with the optimal temperature being 20°C. It is sensitive to frost - exposure to cold temperatures of 1.0-1.5°C severely affects the seedlings and may kill them. The optimal temperature for hemp growth and development is +23-25°C. After seedling formation, hemp grows very slowly for 35-40 days, during which time the root system develops. After this period, the plant enters a rapid growth phase with a daily growth rate of 4-5 cm. The growing period lasts 130-140 days, depending on the variety and agrotechnical conditions. The required active temperature sum is 2600-3300°C. In areas with insufficient sunlight, hemp grows short and weak. It is a soil-demanding plant that thrives in non-saline, humus-rich meadow and meadow-swamp soils with groundwater levels at 80-100 cm depth. In Uzbekistan, the following hemp varieties are cultivated: Uzbekistaniy-1972, 2142, Kuban-338, and 3876.

The hemp stalk yields 17-18% spinnable fiber. Hemp fiber is colorless, clear, but coarse. It is used in the production of sacks, ropes, canvas, upholstery fabrics, packaging threads, and other items. The value of hemp fiber lies in its cleanliness - bags made from it do not contaminate the products stored within.



Figure 1. Products derived from Hemp Fiber

Hemp seeds contain 18-20% oil. This oil is used in the paint and varnish industry and in soap production. In India, it is widely used as lamp oil. Globally, hemp ranks second after jute in terms of fiber production.



Figure 2. Hemp Plant

In crop rotation, hemp is planted after winter wheat, legumes, or alfalfa. It can also be sown after cotton, since fields previously cultivated with row crops tend to have fewer weeds. Because hemp grows slowly in its early stages, it requires weed-free soil. The land intended for hemp cultivation is plowed in the fall to a depth of 28-30 cm. In early spring, to retain soil moisture and eliminate weeds, the autumn plowing is harrowed crosswise. If the plow layer has compacted or if there are many weeds, pre-sowing cultivation or treatment with disk cultivators is performed, followed by harrowing and rolling.

Since hemp is a late crop with small seeds, the soil must be finely tilled and leveled before sowing. Only then can the seeds be evenly embedded, ensuring uniform germination. Hemp stalks are harvested for fiber when they reach technical maturity, characterized by the appearance of lanceolate leaves in the upper third of the stalk. The stalk is cut at a height of 7-8 cm using the JK-2.1A mower. The bark is then removed using an LS-type machine. After peeling the bark (lub) from the stalk, it is spread thinly on the ground and dried for 2-3 days. The stalks are then aligned, bundled into 8-10 kg units, and delivered to the lub processing plant. This method preserves the stalk in a green state, making the bark easier to remove.

**Conclusion:** Hemp is an eco-friendly, fast-growing, and multipurpose technical crop. Proper agrotechnology and processing stages increase production efficiency and open up vast opportunities for industrial use. The hemp plant helps restore ecological balance, improves soil quality, reduces erosion, enhances air quality, and decreases the need for chemical inputs. Moreover, hemp-derived biomass can serve as a raw material for bioplastics, biofuels, and other green technologies, making it a vital component of sustainable agriculture and environmentally conscious production systems.

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