SCIENCE

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FLAX CULTURE IN RUSSIA.

FLAX is cultivated in all parts of European Russia for local consumption, but, according to a recent report by the United States consul at Odessa, it has an importance for manufacture only in twenty-three governments, which sow more than 3,105,000 acres in flax, the remaining twenty-seven governments sowing less than 675,000 acres. With regard to the object for which flax is sown, European Russia can be divided into two regions, the northern and the southern. In the first flax is sown chiefly to obtain the fibre, although with the fibre seed is also obtained, and in the second nearly exclusively for the seed. The northern region of the cultivation of flax for manufacturing purposes extends from the south-eastern part of the Baltic Sea to the central part of the Ural Mountains, within which are the governments of Livonia, Kovno, Vilna, Vitebsk, Pskov, Smolensk, Tver, Yaroslav, Vladimeer, Nijni Novgorod, Kostroma, Vologda, Viatka, and Perm. More flax is cultivated in the governments of Viatka and Pskov than in the others. In the first about 251,000 acres are sown in flax, and in the second about 221,000 acres. These two provinces may be considered as the centres of the cultivation of flax, around which the other flax-producing provinces are grouped. The yield of flax per acre in these provinces is very different, and depends on the quality of the soil in which the flax is sown. An acre of good land gives 400 pounds or more of fibre and from 400 to 535 pounds of seed, but an acre of poor, exhausted soil will not yield more than 160 to 200 pounds of fibre and about 265 pounds of seed. The average yield for the entire region may be considered to be from 265 to 330 pounds of flax fibre and 400 pounds of flaxseed per acre.

The southern region of the cultivation of flax for the sake of the seed consists of the following territory and governments: The Don-Cossack territory, sowing 262,000 acres; Yekaterinoslav, sowing 251,000 acres; Kherson government, sowing 175,000 acres; Taurida (Crimea), Samara, Saratov, Voronezh, Tambov, and Poltava. In the last two provinces flax is grown both for the seed and fibre. Flax for the seed is mostly sown either in virgin soil or in old fallow lands. The yield of seed in this region varies from 400 to 670 pounds and more per acre, and, for an average, may be estimated to be about 535 pounds per acre. The total harvest of flaxseed for all of European Russia attains to about 1,800,000,000 pounds. Considering the average value of the flax fibre to be $186 per ton, and that of the seed to be $44.10 per ton, it will be seen that the value or gain to Russia from the cultivation of flax is about $112,000,000 annually.

The advantages derived from the cultivation of flax would be far more if the qualities of the Russian fibre would correspond with its quantities, and if a larger portion of it were to be exported in a manufactured state. As regards its quality, Russian flax is not only surpassed by Irish flax, but also by flax of many other countries of western Europe (Belgian, Dutch, French, and Bohemian), and is valued in foreign markets lower than any other flax. The low qualities of the Russian fibre are not the results of natural causes, but of the ignorance as to the proper method of treating the flax. The cultivators of flax are chiefly peasants, who partly do not know, and partly do not possess the means to acquire, the latest improvements in the primary technical manipulation of the fibre. Another cause of the imperfect working out of the flax is to be found in the absence of a home demand for a high quality of fibre. Russian factories do not produce linen from the finest numbers of thread, and therefore do not require the highest class of flax. This latter circumstance is unfortunate, as it is a strong impediment to improvements in the manipulation of the flax fibre.

The aim of the producer is a large quantity rather than an improved quality, and the result is a progressive reduction in the fibre. Of late years this has become particularly apparent in the government of Pskov. Formerly Pskov flax had a high reputation all over Russia, but now it is quoted much lower than flax from Velogda, Kostroma, Yaroslav, and Tver. About one-half of the flax fibre produced in Russia is exported abroad only half worked (the unbrushed fibre together with the tow), and the greater part of the fibre remaining in the empire is worked up by the peasants in their farmhouses into thread and linen for their own use, as well as for sale. A much smaller part of the flax goes to the spinning and weaving factories, which are chiefly situated in the governments of Vladimeer, Kostroma, and Yaroslav.

As regards the internal or home trade of flax, it is almost entirely in the hands of small dealers, who drive from village to village and make their purchases in small lots. The flax thus collected is then sent in considerable quantities to the towns which serve as centres to the flax trade.

The *Linum usitatissimum vulgare* and *crepitans* are being cultivated in Russia in several varieties of both kinds, but the difference in these varieties is so slight and they so easily blend that even those initiated in the trade of the article often fail to perceive it. Both have blue blossoms and occasionally white blossoms. The blue-blossom varieties are preferred. About 21,000,000 bushels of seed are annually raised in European Russia.

Flaxseed, as understood in Russia, comprises sowing seed and crushing seed. The first named is a more carefully sorted quality, exported exclusively for sowing purposes. Crushing seed is the surplus seed of the flax plant, which is exported for making oil, etc., as there is no demand for it as sowing seed. With this quality the seed received from the interior is mixed and the whole exported as crushing seed. Of the total quantity exported, viz., 13,000,000 bushels, about two-thirds is described as sowing seed.

The seed is sown in April, May, and early in June. It is sown earlier in the south and south-east than in the centre, west, and north; much depends on whether the seasons are early or late. The harvest begins as early as July and as late as August and September, earlier in the south and later in the north. The number of bushels of flaxseed raised per acre depends on the object to be attained; when the seed is the object, a much less quantity is sown per acre, and when the fibre is desired, a much larger quantity is sown. In the south and east of Russia a little over a half bushel per acre is sown, and the yield is about ten bushels. In those parts of central Russia where the fibre is not utilized, a little over four-fifths of a bushel is sown, and the yield is about ten bushels. In western Russia and those parts of central Russia where the fibre is utilized, a bushel to a bushel and a half per acre are sown, and about five bushels is the yield. In northern Russia, where the fibre is the chief consideration, nearly three bushels per acre are sown, which gives about six bushels of seed and from three hundred to six hundred pounds of fibre.

Flaxseed is usually sown by hand, and the land should be carefully prepared and be of good quality. The ploughing should not be less than nine inches in depth, and the land should be as free as possible from weeds, and thoroughly prepared beforehand for the reception of the seed. After the sowing, the seed is covered by passing a harrow once or twice over the ground. Moist and mild weather favors the development of the plant in all of its parts; a hot and dry climate, with occasional showers, will produce a good development of the seed, but the fibre is usually coarse and brittle, as the lignin parts of the stems then develop at the expense of the fibre. The cultivation of flax, whether for seed or fibre, requires for its proper development a rich and black loam (ten to fourteen inches) having a clay subsoil. Good crops, however, are grown whether the subsoil is gravel or gray sand.

The lesson to American farmers, especially those of the North-west, which the total product of the cultivation of flax in Russia furnishes will be readily appreciated and understood. The possibilities which the cultivation of the flax fibre offers to Western farmers is only equalled by the surprise that such possibilities have thus far been neglected. The seed has been cultivated with more or less satisfactory results in the United States, but the fibre practically not at all. The climate, soil, and conditions generally throughout the North-west are very favorable to the cultivation of the flax fibre as well as the seed. After a short experience, as to the primary manipulation or handling of the flax fibre, our farmers would produce flax which would compare favorably with the best varieties of the fibre. It seems strange that a practical people like ourselves should for years have been satisfied to cultivate flax for the seed at a value of about fifteen dollars per acre, and at the same time allow six hundred pounds of flax fibre per acre to rot on the ground, this flax fibre having a value, after being manipulated, of $186 per ton.

Familiar as our farmers are with the working of improved and expensive agricultural machinery, and the latest developments of the human intellect as applied to the soil, they may always learn something by watching the working of rude ideas as seen in a primitive and unsophisticated people. The main difference between the old and the new system of farming is not one of method, but of expense; and, as physicians never really know what a disease is capable of until they see an outbreak in virgin soil, so it is not possible to fathom all the possibilities of the most commonplace notions and devices until we see them applied with the unconventional freedom and simple directness that belong to comparatively primitive peoples. The Russian peasant is both simple-minded and ignorant. He clings to old methods as much from liking as for the expense which new methods involve. From the flax fibre, by the aid of his primitive and rude contrivance, the Russian peasant produces linen, thread, crash, and other valuable and necessary articles for the use of his family and for sale. It does not require the aid of expensive machinery to make the flax fibre either useful or valuable. The rude machines which the Russian peasant employs are the handiwork of some village carpenter or wheelwright, and are made at a comparatively small cost. If the Russian peasant farmer accomplishes such results, the American farmers, who possess like conditions of climate and soil, should accomplish much more.

The unsatisfactory condition of our farmers in our north-western States, which is certainly due to the overcultivation of wheat, with its yearly decreasing yield per acre, renders it all the more important that a speedy means be found to relieve a condition of things which affects the material interest and welfare of the great majority of the people of the United States. Such a means exists in the flax plant. It will not only enable farmers to make their own linen, rope, thread, crash toweling, oil cake, and much besides, but will cause new industries to be established throughout the country in districts where the advent would be both profitable and new. There should be a general and persistent effort made to encourage the cultivation of the flax fibre throughout the United States, with the view of establishing factories for the manufacture of twine or textiles, and, if our consul's report should develop a proper interest in so important a subject, the result can not fail to be satisfactory.

HEALTH MATTERS.

The Anæsthetic Action of Nitrogen.

WHILE some writers maintain that the anæsthetic action of nitrous oxide is due to its preventing access of free oxygen to the system, others believe that it has a "specific anæsthetic action." It occurred to Dr. G. Johnson (*Lancet*, April 11) that some light might be thrown upon this subject by the administration of pure nitrogen. Accordingly he obtained a cylinder containing 100 cubic feet of compressed nitrogen, in which the proportion of oxygen present was only 0.5 per cent by volume, with 0.3 per cent of CO_2. As a preliminary trial, Mr. F. W. Braine administered this gas in five instances to members of the staff of King's College, who volunteered to submit to the experiments. The result was in each case the production of complete anæsthesia and of general phenomena precisely similar to those observed from the inhalations of nitrous oxide. Encouraged by these results, Mr. Braine felt justified in administering the gas to patients at the Dental Hospital for anæsthetic purposes. Nine patients took the gas. In every case the result was the production of complete anæsthesia, with general phenomena similar to those observed during nitrous oxide inhalation. The pulse was first full and throbbing, then feeble. In the advanced stage the respiration was deep and rapid, and there was lividity of the surface; the pupils were dilated, and there was more or less jactitation of the limbs. The only difference, in the opinion of some of those present, being that the anæsthesia was less rapidly produced, and somewhat less durable, than that from nitrous oxide, though in each case the tooth was extracted without pain.

On a subsequent occasion the same gas was administered by Dr. Frederic Hewitt at the Dental Hospital. As before, nine patients took the gas, The maximum period required to produce anæsthesia was 70 seconds, the minimum 50 seconds, and the mean time 58.3 seconds. In one case two teeth were extracted without pain. In one case only was pain experienced, and in that case, the tooth having been broken up and not extracted, the patient said she felt a "smashing up."

Having on several occasions witnessed the administration by Dr. Hewitt of nitrous oxide mixed with ten per cent by volume of oxygen, with the result of producing anæsthesia without lividity or jactitation, Dr. Johnson determined to try a mixture of nitrogen with a small proportion of oxygen. He therefore obtained from the same source of supply a cylinder containing forty cubic feet of nitrogen mixed with three per cent by volume of oxygen, and a second cylinder equally charged with a mixture of nitrogen with five per cent by volume of oxygen. These gases were administered by Dr. Hewett to patients at the Dental Hospital with the following results. In the case of the three per cent gas, which was given to five patients, the time required to produce anæsthesia varied from 60 to 75 seconds, the average time being 67.5 seconds. In each case the tooth was extracted without pain, the duration of anæsthesia being somewhat longer than with pure nitrogen. In each case there was lividity, dilatation of pupils, and more or less jactitation. On the same day Dr. Hewitt gave nitrogen with five per cent oxygen to four patients. With this mixture the time required for the production of anæsthesia ranged from 75 to 95 seconds, the average being 87.5 seconds. In each case there was complete anæsthesia, during which one patient had three molars extracted, and, although she said she "felt the two last," the sensation appears to have been that of a pull, and not of acute pain. In all of these four cases there was slight lividity before the face-piece was removed, but in only one case was there slight jactitation of the limbs. The other three patients were perfectly quiescent.

The experiments here recorded suffice to prove that nitrogen, pure or mixed with a small proportion of oxygen, is as complete and apparently as safe an anæsthetic as nitrous oxide. It is to be hoped that those who are engaged in the administration of anæsthetic gases will investigate this interesting subject further, with a view to ascertain whether atmospheric air, partially deprived of its oxygen, may be advantageously substituted as an anæsthetic for nitrous oxide.

Treatment of Phthisis.

According to the *Lancet*, Dr. Germain-Sée, in his new method of treating phthisis, shuts his patient up for two, three, or more hours daily in a hermetically closed metallic chamber, into which is slowly admitted a current of compressed air, which, having passed through a mixture of creosote and eucalyptol, is saturated with the vapor of these substances. Since August last ten cases of phthisis have been submitted to this treatment, all of which cases, with one exception, had reached the period of softening, and bacilli had been detected in the sputa. The results obtained were return of appetite, even in advanced cases, gain of weight and strength, fall of temperature to the normal in a week or two, disappearance of hæmoptysis, diminution of cough and of purulency