

DEVELOPMENT CONCEPT MANAGEMENT OF FLAX BIOLOGICAL RESOURCES (SCIENTIFIC AND EDUCATIONAL COMPLEX)

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Abstract

Flax is the oldest plant of bilateral use it is a promising crop. One of the most urgent tasks for flax in Russia is to increase production and improve the quality of flax provided on fiber and seeds. Promising innovative directions in flax subcomplex agribusiness are processing technology, breeding and seed production, agronomy, machinery. «Education - science – business» is a chain in Tomsk region. The expansion of scientific and educational space will be created technological and economic conditions for the sustainable development of flax complex.

Key words: *flax, linum, productivity of fiber and seeds, education, science, business, technological and economic conditions, sustainable, development, variety, biological resources, genotrophs*

Flax is the oldest cultivated plants since prehistoric times companion of man. Its history goes five thousand years ago. In antiquity linen cloth was an indicator of luxury in ancient Egypt and the Middle East. It was popular on the shores of the Caspian and the Black Sea. Flax was considered part of the now Swiss farming lands during the Stone and Bronze Ages. Linen yarn used in weaving ropes for hunting and fishing nets for what told excavations in the old Swiss lakes. Anciently masters achieved extraordinary quality linen products. Fabric was thin, but strong and socks with characteristic sheen. In ancient times clothing made of linen cloth worn pharaohs and their governors. In ancient Egypt linen from flax were the monetary unit also linen fabric used for the burial of nobility. As in ancient times in Christianity and nowadays the linen garments are considered a symbol of purity so the priests wear clothes made of pure linen without the addition of other fibers. Until now historians have not found where the linen was manufactured for the first time (Tobler et al 1928).

In national economics using all organs of flax for the needs. Textile fiber necessity in flaxseed is great because many of the products it can not be fully replaced by products from chemical fibers. Fiber fineness depends on the time of harvest: for a very early harvest fiber is thin and flexible, low yield. At the time of ripening of the fiber quality is reduced it becomes coarse, brittle fiber output increases.

The seeds contain 35 - 37% fat get linseed oil witch used in paint, chemical, canning, cooking and medicine. For animal feeding use cake containing up to 7% crude fat and 34% crude protein. One kg of linseed oil cake contains on average 1,15 feed units and 260 g of digestible protein. Linen campfire contains up to 64% cellulose so it is used in cardboard and paper industry (Hemker 1989).

Reserve to increase the yield and quality of flax is a better use of natural factors and the maximal realization of the biological potential of new high-yielding varieties, improvement and development of energy saving agrochemical tricks to create optimal conditions for the growth and development of flax.

Scientific bases Crop management flax currently is not enough developed. Variety of flax can create a background and a main influence in conditions of extreme continental climate of the West Siberian region has complex technical measures that reduce or increase the effect of natural environmental factors (Chudinova et al. 2000). Flax unique feature is some varieties after growth for one generation to well-defined environmental conditions found genetic changes (Cullis 1981, Durrant 1962, 1971). The stable line witch emerging called genotrophs differ from one another and from the initial variety. It's allows you to evaluate the county as a very interesting model in terms of the study of epigenetic mechanisms of regulation of the genome.

The basis of our concept include this following provisions:

- Biological resources of soils of different genesis are the basis of productivity and promising hybrids varieties of flax in Western Siberia.
- Microbial preparations and environmentally sound growth promoters and development of plants selectively have a positive impact on productivity of flax.
- Genotrophs is a biological resource increase productivity flax.
- Comprehensive statistical estimate the influence of abiotic, biotic (genetic, protokooperative), anthropogenic factors on the productivity of the main indicators of flax.

Flax complex investment attractiveness lies is the growing market volume of textile and textile products made from natural fibers. Analysis of average world prices for costumes and dress and household products or technical flax shows that the composite index - the price per kilogram of product is for clothes 16 dollars of USA for kg and for technical textiles - 4 dollars of USA for kg. Situation in the world mainly North American and Western European markets of textiles made of natural fibers, dynamic textiles in China in the past ten years has allowed to increase annually by 10% the volume of flax in Western Europe.

The problem of deep processing of bast crops primarily related to the replacement of wood pulp cellulose annual plants (flax, hemp, etc.). Bast crops will help in saving the global forest industry. Pulp production is growing of hemp, flax, reed, bamboo, etc. It amounted to 6.8% in 1995 of the total pulp production in 1998 - already about 11%, the forecast for 2020 - more than 30%. Cellulose of bast crops of a high quality and can be used in the manufacture of cigarette paper, hygienic products, banknotes. Biomass volume is very high. It exceeds this ratio in wood on 2-2.5 units. α - cellulose is content in bast crops can reach 90% whereas in hard and soft wood 50-54%. Collection of fiber 1 ha of crops Bast Crops 8-10 times greater than the fastest growing tree in our climate zone - poplar. Bast crops should take rightful place in the economy in terms of raw material for pulp. This is strategic direction. The question of annual production of cellulose-containing plants adopted Seven developed countries as one of the 20 priorities of the XXI century.

Cellulose esters is basic products which can be obtained from cellulose bast crops. Cellulose ethers are used to produce powder, adhesives, fibers, lacquers and paints for formulations of oil.

Bast crops are the only domestic crude plant capable of fully replace cotton and provide strategic and financial independence of Russia. While bast crops unlike oil and gas - annually makes up raw material resources witch has not negative impact on the ecosystem. Moreover, planting bast crops (flax) can improve the environmental situation due to the accumulation of plant material of heavy metals (cadmium, lead, copper, etc.) from the soil. This technique is used now in several countries of Western Europe for contaminated by heavy metals.

Food processing flax are good raw material for nonwovens. These materials are made of low-grade fibers or waste. Range of applications from furniture to geotextile for strengthening embankments, slopes, pond banks by creating grass mats. Natural fiber materials, especially flax, hemp, kenaf, etc. are the feedstock for advanced composite materials. It is known that polymers have reduced the use of steel and iron alloys with 80% in 1965 and 60% in 1995 according to the company's Mercedes-Benz in the manufacture of each vehicle used about 5 kg of natural fibers. They are introduced into polymers and make them more durable, flexible, resistant to deformation and weather conditions. It's reduced weight of car. The bumpers of composites containing natural fiber materials make the factories Ford Renault and Fiat. According to its superior performance characteristics biocomposites materials made using fiberglass or synthetic fibers and also have less negative impact on the environment (for recycling). These biocomposites can be find successful application in the construction of roads, irrigation systems, ports, etc.

Crumbled straw of flax and fire are excellent material for the production of medium density fiberboard. The fiber panel occupied a leading position in the furniture industry in Europe and becoming more popular. Flax straw produced excellent insulation panel. These panels are lightweight

and have a very low thermal conductivity. On the railways in India received widespread jute panels which are produced by a very simple process (impregnation, drying, pressing and injection molding in a heated state).

Moreover, flax cellulose culture is polyfunctional unlike cotton. It is not only the raw material for the textile industry but also strategically important raw materials used in many industries: composites to meet modern environmental standards and applied in various fields; its wood - raw materials for the furniture industry; lignosulfonates flax - auxiliary materials for sizing processes in the textile industry and the insulating material for burial NPP, linseed oil - the raw material for cosmetics, pharmaceutical and food industries; waste (flock, fire) - the raw material for composite materials automotive and construction industry.

High capacity to absorb flax with soil moisture micronutrient compounds including heavy metals and which enter into the soil in the various processes of the biosphere. It's can be used for purification of the lithosphere of the excess amount of heavy metals and provides a basis for developing small field (in the limit one field) intensive technology of cultivation of flax by dosing of trace elements in the soil (Thorn 2000).

Along with traditional products of flax processing textiles and as linseed oil the implementation of modern technology will enable the processing of flax processing processes much more deeply and extract the whole range of products essential to the national economy. For example complex processing flax seed will highlight one such biologically active compounds as sterols, squalene, vitamin E and a number of other compounds and create new groups based on their domestic biologically active compounds including drugs and health medical and hygienic products. Specialists estimate that the value derived from flax biologically active substances can reach 20 thousand USA per 1 ton of processed raw linseed.

Absolute value of flax linked to the existence of various organic compounds. Flax seeds are excellent source of balanced essential fatty acids especially « ω -3" which responsible for the growth and functioning of the body.

Promising is the development of technology for flax carbon black and activated carbon. The main raw material for the production of carbon black and activated carbon is a fire which is currently in Russia is 195 thousand tons of year. To the needs of the construction and used as fuel for about 40% of this amount. If the remaining amount of (60%, 120 kt) equally produce carbon and activated carbon the value of output can reach 42 million dollars of USA. Even if the total cost of production units of carbon black and activated carbon will be 10 million dollars of USA the benefits of the organization of production is evident.

Complex processing of stem annual plants (flax, hemp, etc.) along with getting the desired product cellulose and its subsequent processing into fiber materials, cellulose esters (for the needs of the oil industry), trinitrotsellyuloza (for the military), and others, will allow result of the introduction of additional steps extraction and fermentation process more deeply plant material to obtain raw materials for building materials, raw materials for the chemical industry, vitamin-enriched feed for livestock, etc.

Cheap and strategically important domestic raw material is fiber flax and hemp flaxes. From it you can do not only competitive twine bags but also environmentally friendly heat and sound insulating materials (volume of about 200 thousand tons per year).

Development of modern technologies for processing flax and other bast crops allow more than 10 in this sector of the industry to intensify Russia with a total annual economic benefit from the sale of the whole complex of modern technology - about 250 million dollars of USA.

However, most of the varieties of flax does not meet the requirements of modern processing are insufficient quality fiber does not have enough resistance to lodging and diseases. The vast majority of high-yielding varieties is characterized by low adaptability to extreme environmental factors. In addition, low multiplication factor the need for breeding hardly compatible signs - high yield fiber and

seed, high yield and fiber quality have led to the fact that traditional flax breeding at the moment is a time consuming process requiring great skill time and resources to create new competitive varieties.

For flax industry in Russia one of the most urgent tasks is to increase production and improve the quality of flax provided fiber and seeds. Innovative directions witch promising in flax subcomplex of agriculture of Russia are as follows:

- Selection and seed technology (adaptive, high-yielding varieties with the most efficient use of limiting factors (nutrients, light, water) stable on qualitative indicators of fiber).
- Agronomic Technology (minimizing the use of man-made factors in the cultivation of flax (tillage, chemical protective agents against pests and diseases, fertilizers).
- Machine technology (self-propelled high-performance equipment which allows to reduce labor costs and time of manufacturing operations while improving the accuracy of their implementation).
- Processing Technology (diversification of processing to make full of flax fiber, seeds, bonfires with the size of agricultural enterprises).

Tomsk region is historically traditional manufacturer and supplier of flax fiber for weaving mills in Central Russia. Here is the only research institution in the Urals the leading selection of high-yielding varieties of flax capable of producing high quality raw materials and seeds in extreme climatic conditions witch production-oriented seed flax higher reproduction and uterine elite - Siberian Research Institute of Agriculture and peat. Its activities are focused on providing complete uterine elite seeds flax enterprises of Tomsk region. Capabilities are enable the Institute to completely cover the needs of enterprises of flax most of Western Siberia so further development of breeding activities of strategic importance for the effective development of flax complex. Institute staff deduced 9 Early and middle-classes varieties of which 8 are included in the State register of breeding achievements of the Russian Federation. On genotype of Tomsk varieties and hybrids created more than 50 varieties of flax. Varieties Tomsk-16, Tomsk-17, Tomsk-18 successfully cultivated and used in breeding programs in Russia, Ukraine, Belarus, the Baltic States, Western Europe and China. Annually in breeding elaboration is more than 1,5 thousand hybrids. Further development of breeding activity is of strategic importance for the effective development of flax complex of Tomsk region and West Siberian region.

Dignity of Tomsk flax: earliness (compared with European varieties); resistance to adverse climatic conditions, lodging, diseases; high productivity (as straw, seeds, fiber); high fiber content, cellulose in the stems; High yield fibers are long, the quality and the tensile strength; adaptability to modern technologies of cultivation and deep processing of fibers; suitability for a wide range of products - from tow buildplate, modilen, sorbents, cellulose, textiles, nonwovens to biologically active dressings, medical cotton, nanomaterials.

Variety «Tomsk -16». Ultra-early. Vegetation period of 65 -77 days. Included in the State register of breeding achievements of the Russian Federation of the West-Siberian region. A distinctive feature of sorts is the first time in Western Siberia obtained grade which combines high productivity and fiber quality. Quality of combed fibers reaches 22 number. The fiber content in the stalks to 30% long fiber yield - 11.4%. Has high plasticity and capable of producing high yields in different soil and climatic conditions. Seed to 10 kg of ha, the fiber 14,2 kg of ha. Resistant to fungal diseases, rust, fusarium and to shattering and lodging. Aligned of hight andmaturation. Suitable for modern technologies of cultivation and processing. It's established so good in the textile industry and the production of nonwovens can be effectively used in modern processing technology to produce other products. Economic, biological, technological features and properties of varieties of flax Tomsk-16: Yields (q of ha) of straw including: 39,1; fiber 14,2; long fiber 11,4; seeds to 10,0. The fiber content of 30.0%. Vegetation period 65 - 77 days. Diseased (rust 0%, fusarium 2,7%). Average number of long fiber 15,1. Resistance to lodging 5,0. Fortress of 18,7 kg of cm. Flexibility 52 mm.

Variety «TOST». Early maturing. Vegetation period 70 - 78 days. Included in the State Register of the Russian Federation of the West-Siberian region. A distinctive feature of varieties has high fiber

content (average 30,1%), pulp yield of long fiber (13%), the spinning properties - by spinning refers to one group. Average number of long fiber 18,8. Average plant height and stem length. The variety is resistant to lodging and disease rust and fusarium. The average yield of straw 44,6 q of ha Seed - 8.2 q of ha. Variety is well established in the textile industry and can be effectively used in modern processing technology to produce other types of flax. Economic, biological, technological features and properties of varieties of variety: Yields (q of ha) of straw including: 44,6; fiber 12,3; long fiber, 7,6; 8,2 seed. The fiber content of 30,1%. Vegetation period 70 - 78 days. Diseased (0% rust, fusarium 12,6%). Resistance to lodging 5. Average number of long fiber 18,8. Fortress fiber 16,4 kg of cm. Flexibility 61 mm.

Variety «TOST 4». Early maturing. Vegetation period 77 - 79 days. Included in the State Register of the Russian Federation of the West-Siberian region. A distinctive feature of varieties has high fiber content (average 29,6%), pulp yield of long fiber (15,2%). Average number of long fiber 14,3. Relative breaking load accounted 15,2 gf of tex. Evaluation of the class demonstrating its high quality and promise. High plant has a long stem, resistant to shattering has a complex resistance to rust, fusarium wilt, lodging. Suitable for modern technologies of cultivation and processing. Variety can be recommended for textile and other flax. There is evidence of successful experiments on obtaining cellulose powder from varieties. Economic, biological, technological features and properties of varieties: Yield (q of ha) of straw including: 48,2; fiber 17,6; long fiber 13,8; 10,3 seeds. The fiber content of 29,6%. Vegetation period 77 - 79 days. Diseased (0%rust, fusarium 2,2%). Resistance to lodging 5,0 points. Average number of long fiber 14,3. Fortress of 15,2 kg of cm. Flexibility 60 mm.

«Krepkov Memory» Variety. Early maturing. Vegetation period 70 - 74 days. Included in the State register of breeding achievements permitted for use on the West-Siberian (10) region since 2012. Distinctive feature: quality fibers of the second group, featuring 15 number of long fiber content in the stems of 32-36%. Seed yield of 10 - 12 kg of ha, the yield fibers 12 - 14 kg of ha. Resistant to lodging and diseases. Suited to modern technologies of cultivation and processing. Economic, biological, technological features and properties of varieties: Yields are likely q of ha, including: 47; Fiber 12 - 14; 9 long fibers; seed 10 - 12. fiber content 32 - 36%. Vegetation period 70 - 74 days. Diseased (0% rust, fusarium 2,5%). Lodging resistance of 4,8 points. Average number of long fiber 15. Fortress fiber 20.8 kg of cm. Flexibility of 54 mm.

Variety «Tomsk- 17». Early maturing. Vegetation period 70 - 76 days. Included in the State Register of the Russian Federation on the North-West (2), Central (3) and West Siberia (10) regions. A distinctive feature of the variety: high quality fiber. Output of long fiber – 20,8%, the yield of total fiber average of 16,4 kg of ha, number scutched fiber on average 14,0, the relative tenacity of 14.6 gf of tex.. Resistant to lodging 4,4, disease - rust polisoroz, fusarium. Suited to modern technologies of cultivation and processing. On large opportunities varieties says the following fact: in 1992 Birilyussy testing plots (Krasnoyarsk region) obtained crop straw 138,9 kg of ha, long fiber 39 q of ha, total fiber 45,7 kg of ha, seed 9,4 q of ha. This is a world record for flax. It is recommended to use in the textile industry and for the production of nonwovens. Economic, biological, technological features and properties of varieties: Yields (q of ha) of straw including: 52,9; fiber 16,4; long fiber, 11,5; Seed 7,8. The fiber content of 36,2%. Vegetation period 70 - 76 days. Diseased (0% rust, fusarium 4,0%). Resistance to lodging 4.4. Average number of long fiber 15,1. Fortress of 18,2 kg of cm. Flexibility 56.3 mm.

Variety «Tomsk-18». Early maturing. Vegetation period 76 - 80 days. Included in the State Register of the Russian Federation on the Volga-Vyatka (4), West Siberian (10) and the East Siberian (11) regions. A distinctive feature of varieties combines high productivity with quality fiber the second group, showing the 15th number of long fiber. Assessment Institute of Chemistry and solutions fiber flax varieties Tomsk-18 received the highest score in the deep processing of fiber modilen and getting high-tech materials based on flax. Grade high-yielding Seed - 12.2 kg of ha, the fiber - to 17, 0 kg of ha including long fiber yield 11,9 t of ha. The fiber content of 32-36% in the stalks. Resistant to lodging and to major diseases (rust, blight). Suited to modern technologies of cultivation and processing. Has worked well for the production of products for medicine (dressing packets, cotton, bandages, swabs, etc.) in the textile industry. Economic, biological, technological features and

properties of varieties: Yield of straw (q of ha) including: 58,4; fiber to 17.0; long fiber, 11,9; seeds to 12.0. Fiber content 32 - 36%. Vegetation period 76 - 80 days. Diseased (1,9% rust, fusarium 9,0%). Resistance to lodging 4.6. Average number of long fiber 15.1. Fortress fiber 15,6 kg of cm. Flexibility 56,0 mm.

Variety «TOST 3». Mid-season. Vegetation period - 81 days. Included in the State Register on the Volga-Vyatka and Western Siberia. A distinctive feature of the variety: high long fiber content and its quality - refers to a group of two spinning. High plant with a long stem. Sort by high-yielding seeds and straw. Resistant to disease, shattering, drought and lodging. According to the modern varieties of flax Variety «TOST 3» attributed to a high level in terms of productivity and quality of long fiber. Fiber content – 20,6%, the yield of long fiber – 17,5%. Suitable for modern technologies of cultivation and processing. It can be used for textile and nonwovens. Economic, biological, technological features and properties of varieties: Yield (q of ha) of straw including: 77,4; fiber 20,8; long fiber 15,2; 10,3 seeds. The fiber content of 29,6%. Vegetation period 81 days. Diseased (0% rust, fusarium 2,2%). Resistance to lodging 5.0 points. Average number of long fiber 17,5. Fortress fiber 15,1 kg of cm. Flexibility 60 mm.

Variety «TOST 5» Mid-season. Vegetation period 77 - 81 days. State registry included in the Northwest, Volga-Vyatka and Western Siberia. A distinctive feature of varieties well aligned height and maturation. Resistant to lodging, shattering, drought and disease. Refers to one group of stability in fungal diseases. The plant is high. Long stalk. The fiber content in the stems 31,6% higher than the standard 1,6%, the yield of long fiber 23,2%, relative breaking load estimated 15,6 gf of tex. High crop straw (48,3 q of ha) and seed – 10,3 q of ha. Suitable for modern technologies of cultivation and processing. Can be recommended for textiles and nonwovens, as well as for the production of other types of flax. Economic, biological, technological features and properties of varieties: Yield of straw (q of ha) including: 48,3; fiber 20,8; Long 23,2; 10,3 seeds. The fiber content of 31,6%. Vegetation period 77 - 81 days. Diseased (0% rust, fusarium 2,2%). Resistance to lodging 5,0. Average number of long fiber 17,5. Fortress of 15,6 kg of cm. Flexibility 60 mm.

Thus, the potential of Tomsk region flaxcomplex is measured not only by the capacity development of flax and recycling but also the achievements of breeders of Tomsk. There are 4 varieties of the Certificate of flax (Tomsk-16, Tomsk-17, Tomsk-18, TOST), 3 selection patent (TOST 5, TOST 4, Krepkov Memory), an invention patent (Method of flax growing).

In the Tomsk region has all the prerequisites for business development associated with flax. «Tomsk flax» Ltd. is an organization specializing in growing and processing flax. Produces the following products:

- Tow linen and jute tape. Tow Band - comfortable and tech insulation, manufactured by stripper polarization and natural linen or jute fiber carding machines in the tape thickness 7 - 10 mm, a width of 15 cm and a length of 80 m This is additionally treated flax fiber from fires (wood failure of the stem flax). When distributing the tape roll tow just rolled along the rim of the framework. Used in the construction of square log and timber homes. Benefits tape tow: fast layout insulation; uniform distribution along and across the crown; ease and speed of caulking (if necessary); accurate calculation of the amount of insulation to build a house; convenient and easy packing roll; capillary fiber structure will support natural ventilation and healthy environment in your home.
- Crown felt - cushioning insulation material, which is obtained using a single-processor machines needled nonwoven technology taken from the textile industry. Crown felt more dense and uniform fabric than a tow band and is available in three types: linen crown felt - a natural non-woven fabric, known as Inovatin «euroflax», made from 100% flax fiber (flax and jute crown felt - natural nonwoven fabric consisting of 50% flax and 50% jute; crown jute felt - natural nonwoven fabric consisting of 90% jute and 10% flax). Crown felts has significant economic, technological and aesthetic benefits: 2-3 times reduces the complexity of the layout of insulation; do not «spreading» of loads crowns, shape-retaining crown compound (joint); provides continuous and uniform crown insulation; it is not necessary to level the width, just spread and crown in the groove; resistant to

temperature changes and changing climatic conditions; material quickly freed from moisture, not dusty and not blown; saves money because of the possibility of accurately calculating the required amount of length and width to the object under construction; allows the use of logs without expansion gap; allows plunge boring machine through the web; eliminates the process of caulking; eliminates the possibility of pulling insulation birds; antibacterial and antiseptic properties of flax protects the wood from rotting and visiting textile insulation insects (moth pupae); ease of transport and storage of rolls, packaged in shrink-wrap; optimum content of lignin (a natural polymer) allows glue elementary bast fibers, increasing the strength of the seam crown; used in the construction of houses from profiled timber and logs; provides a healthy environment in your home.

- Flax and jute felts (insulation). Modern 100% natural insulating material for insulation of buildings, walls, can be used as a covering insulating material. This higher quality insulation in form and differs from crown felt denser web, and has the following varieties: Linen insulation structure 100% flax, Flax and jute insulation - 50% flax fiber composition of 50% natural jute. Heaters flax and alax and jute felts are hygroscopic absorb moisture well and at the same time give it quickly, do not grow old and resistant to decay, have high thermal insulation properties (thermal conductivity of small linen material). Flax has a higher degree of polymerization of the cellulose, is 2-3 times higher than that of cotton, so rupture strength as it surpasses cotton, jute and wool. This higher quality insulation in its form and content.
- Long fiber (flax Scutched) № 9 – 14
- Plumbing fiber number 8 – 9. Plumbing fiber - a traditional seal threaded pipe joints in plumbing and construction work.

Deep processing of short fiber, which intend to engage in the enterprise, has good prospects, due to the high demand for nonwovens and composite materials in the domestic and foreign markets. By the end of 2013, «Tomsk flax» Ltd. produced 135 tons of long fiber, 540 tons and 750 tons felt - tape tow. Produced also needled fabric. Plans to launch the production line with capacity of 1000 kg of h for processing scutch (production biogranules for pets). Modernization of existing facilities and the creation of a new line of products, according to the plans the economy, will increase profitability flax production more than doubled - up to 45-55%.

The main factor for productivity and economic growth of any country is the availability of highly qualified specialists.

Training of highly qualified personnel agrarian engaged in Tomsk in two Universities: specialty «Agronomy» get in Tomsk Agricultural Institute, Tomsk State University, a diploma in «Technology of production and processing of agricultural products» in Tomsk Agricultural Institute. We built a chain: education - science - business. Within the framework of scientific and educational complex (Siberian Research Institute of Agriculture and Peat, Tomsk Institute of Agriculture, etc.) are performed annually high-level research. There are intellectual property, copyright certificates, patents. The laboratory flax Siberian Research Institute of Agriculture and peat on experimental fields have practice and protect graduation theses students of the Institute.

After years of comprehensive research obtained conclusions:

- In developing the scientific base for yield and fiber quality products and the cultivation of flax seeds in the Western Siberia used potential of the microbial community. In all of the soils in the spring ammonification processes predominate. Predecessors especially forage crops and winter rye, positive influence on the content of bacteria and antagonists actinomycetes improve phytosanitary condition of the soil.
- The size and composition of epiphytic and rhizosphere microflora and flax seed cultural specific and depend on the type of soil, vegetation time. Azotobacter and cellulolytic microorganisms grow well in the rhizosphere of flax but not on the surface of the leaves and seeds. Not found on the seeds and true phytopathogens.

- Location bolls on the plant affects the quality of flax seed. Total number of microorganisms on the seeds as a whole depends on the year of study
- One of the most promising and environmentally friendly methods of regulation yield of flax is to enrich the soil microbial antagonists phytopathogenic micromycetes. Antagonism of mikromitcets phytopathogenic bacteria depends on the source of carbon and nitrogen in the environment. Antagonistic activity of the bacteria is enhanced by the presence of protein in the medium or ammonium, starch, glucose and maltose.
- In the rhizosphere of flax develop a considerable amount organisms plant growth stimulants. The most active stimulants are *Bacillus virgulus*, *Bacillus agglomeratus*, *Pseudomonas rubigenosa*, *Pseudomonas caudatus*. Catalytic activity of the bacteria is dependent on the carbon source and well evident when the medium contains mannitol, starch, galactose, xylose, sorbitol.
- Developed rapid method to detect the efficiency of biologics in the early stages of ontogenesis. This will lead to a more rational use of resources and enable the prediction of productivity of flax in the laboratory for 20 days regardless of the time of year for physiological tests.
- The formation of microbial communities in the soil affects the action of root exudates.
- Genotrophs hybrid forms of flax have high adaptive characteristics, higher rates of productivity: seeds (up to 5,7 g) and fiber (33%), resistance to disease and lodging.
- Comprehensive statistical assessment of the impact of soil and climatic conditions on the elements of productivity flax showed that the greatest contribution to the differences contributing factors «variety» and «type of soil» Reactions to biologicals preparations is determined.

The expansion of scientific and educational space will be created technological and economic conditions for the sustainable development of flax complex.

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