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**BIOLOGICALLY ACTIVE COMPOUNDS AND PREPARATIONS FOR  
AGRICULTURE PRODUCED FROM LUMBERING AND WOODWORK  
WASTE**

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# Scientific, technical and technological novelty

At the N.N. Vorozhtsov Novosibirsk Institute of Organic Chemistry special consideration is paid to development of the plant protection products from renewable natural raw materials.

## Advantages of preparations:

- complex action to the plants;
- increase of plant resistance and raising the level of crop yield;
- high efficiency with low product consumption;
- human and environment friendly;
- conduce the production of ecologically pure products;
- unlimited renewable vegetable raw material resources;
- possibility of production from lumbering and woodwork waste.





# Product produced from fir-tree and developed at the NIOCH SB RAS

Name	Known application	Active components	Patent number
<b>NOVOSIL (fir)</b>	Immune- and growth stimulator of agricultural plants	Acid fraction of extract from the needles of Siberian fir, triterpene acids composition	2108803
<b>VITAPRINOL (fir)</b>	feed additive for poultry (analogue of composition RASTSTIM)	neutral (lipidic) fraction of extract from the needles of Siberian fir	2336889
<b>COMPOSITION FOR PRODUCTION OF PREPARATION FOR CROP YIELD INCREASING AND FUNGICIDAL ACTION (FIR)</b>	Increasing of the level of crop yield for vegetables and cereal crops, fungicidal activity	Bornilacetate, borneol, composition of terpenes from waste of <b>NOVOSIL</b> I production process (volatile fraction)	2469539
<b>CONCENTRATE OF AQUEOUS EXTRACT FROM THE NEEDLES OF SIBERIAN FIR (FIR)</b>	Feed additive for cattle	Concentrate of sugars, oligosaccharides, flavonoids, aqueous extract - waste of <b>NOVOSIL</b> I production process	2348168
<b>ABISTIM (FIR)</b>	Growth of cereal crops and vegetables with fungicidal and antistress properties	Composition of biologically active glycosides of phenol and polyphenol compounds of mono- and polysaccharides, maltol from the needles of Siberian fir	2355170
<b>PIHTOROS (FIR)</b>	Preparation for agricultural plants protection with growth stimulation and fungicidal action	Fir oil in the form of stable emulsion with liquid soap	2432744
<b>PIHTOROS+ (FIR)</b>	Preparation for agricultural plants protection with growth stimulation and fungicidal action	Fir oil in the form of stable aqueous emulsion	2443111
<b>KLIPS (FIR)</b>	Growth and immune stimulator with fungicidal activity	Composition of biologically active compounds from lipidic fraction	2372930
<b>LEOLILA (FIR)</b>	Growth stimulation and protection of agricultural plants from diseases	Composition of aliphatic and diterpene acids, sterols	2437286
<b>BIUS (FIR + LICHEN)</b>	Suppression of root rot formation and plant growth stimulation	Extracts from the needles of Siberian fir and from lichen (usnic acid)	2437285



**Commercial wood**



**Waste ~30%**



# Product produced from larch, lichen and developed at the NIOCH SB RAS

Name	Known application	Active components	Patent number
<b>LARUS</b> <b>(LARCH + LICHEN)</b>	Preparation for wheat protection from diseases and increase level of crop yield	Composition of dihydrokvercetine, usnic acid with salts additive	2464785
<b>BIOFUNGISTIM</b> <b>(LARCH)</b>	Increase of the level of crop yield for cereal crops due to growth stimulation and decrease of morbidity level	Composition of phenilpropanoides, sterols, diterpenes. The composition is produced from fresh chopped Siberian larch timber	2324352





A large glass jar containing a green liquid, likely a culture medium, with a metal lid and a label. The jar is filled with a green liquid, and the lid is partially visible at the top. The jar is placed on a surface, and the background is dark.

- increase of the level of crop yield by 25 - 30%;
- enhancement of seeding, plant viability in extreme climatic conditions by 14 - 17%;
- enhancement of fruits and seeds quality – seed mass increase by 4 - 5%, increase of seed unctuosity by 3 - 3.5%, as a result raising the level of crop yield of 5 - 8 centner per hectare);
- 15 - 27% increase of productive bushiness;
- decrease of plants morbidity of fungous, bacterial and viral diseases (phytophthora, root rot, etc.) by a factor of 5;
- decrease of crop losses during a storage.

A large, vibrant pile of various fresh vegetables, including leafy greens, carrots, broccoli, and asparagus, arranged in a mountain shape.

- fruitification enhancement;
- reduce of harm from plant diseases;
- enhance a quality of plants – saccharinity and unctuousity , decrease of acidity and nitrates content;
- suitable for seed wetting for acceleration of germination and growth activity;
- better ovary preservation especially at low temperatures.

**NOVOSIL** is a registered preparation in national Russian catalog of pesticides suitable to application in Russia.

**Patents** 2108803, 2147400 (RU)

# PIHTOROS



**PIHTOROS** - low dose preparation produced from renewable natural raw materials. **PIHTOROS** is a stable 1 - 5% water emulsion with liquid soap and containing fit oil extracted from the needles, verdure and cortex of Siberian fir.

Field tests of **PIHTOROS** on cereal crops (wheat, barley, oat), onion, potato plant showed decrease of plant morbidity of root rot, dust-brand and raising of crop yield level by 32 - 69% in comparison to infected control plants.

## Advantages of **PIHTOROS**:

- high efficiency against fungous and bacterial diseases of agricultural plants;
- low consumption of preparation in preplant and vegetation phase processing;
- easy application and dosing;
- full safety for agrocenosis and human;
- easy producing technology without expensive equipment;
- solving the problem of rational use of Siberian fir lumbering waste.

**Patent** 2432744 (RU)





# LIPIDIC FRACTION OF EXTRACT FROM THE NEEDLES OF SIBERIAN FIR (VITAPRINOL)

New technology of production of biologically active lipid **FRACTION OF EXTRACT FROM THE NEEDLES OF SIBERIAN FIR** (*Abies Sibirica*) was developed at NIOCH SB RAS. The technology allows to produce **LIPIDIC FRACTION** and additional biologically active compounds (used as a fodder additive for fowl) from waste of NOVOSIL production process.

Efficiency of fodder additive (norm consumption 0.7 kg per ton of fodder) was demonstrated on chicken-broilers and quails:

- increase of average 20-days broiler weight by 9.1%;
- enhancement of young animals safety by 14%;
- average daily live weight increase by 11-13%;
- decrease of forage consumption per 1 kg of addition weight by 6-12%;
- increase of quails egg production in preproduction period by 7.9-20%;
- decrease of forage consumption for quails by 12.3-24.6%.

Fodder additive is registered under the trade mark **VITAPRINOL**.

**Patent** 2336889 (RU)



# COMPOSITION FOR PRODUCTION OF PREPARATION FOR CROP YIELD INCREASING AND FUNGICIDAL ACTION

New **COMPOSITION** for production of preparation from needles of Siberian fir extract was developed at NIOCH SB RAS. The composition contains bornilacetate and borneol (45-50 *weight%*), sum of terpenes and serves to increase the level of crop yield for vegetables and cereal crops, fungicidal action like preparations NOVOSIL.

## Advantages of the composition:

- high biological, fungicidal and growth stimulating activity resulting in increase of the crop yield level by 12 - 46% (wheat, oat, cucumber, potato plant, garlic, onion);
- easy-to-use preparative form for use and dosing;
- reducing ecological effect to environmental due to decrease of processing ration and total preparation consumption;
- simple producing technology without expensive equipment thus possibility to large-scale production of the preparation at the fir lumbering manufacture.

**Patent** 2469539 (RU)





# CONCENTRATE OF AQUEOUS EXTRACT FROM THE NEEDLES OF SIBERIAN FIR

We developed ecologically clean technology for production biologically active composition - concentrate of sugars, oligosaccharides from waste of Novosil production process. The **CONCENTRATE** is used as a fodder additive for cattle.

**CONCENTRATE** was demonstrated to increase safety, stimulate growth and productivity of chickens.

**Patent** 2348168 (RU)



# ABISTIM



**ABISTIM** – low dose ecologic preparation for growth of cereal crops and vegetables with fungicidal and antistress activity. **ABISTIM** is a composition of biologically active glycosides of phenol and polyphenol compounds of mono- and polysaccharides, maltol from the needles of Siberian fir.

**ABISTIM** serves for preplant processing of seeds, tubers, bulbs during vegetation period.

## Use of low dose of ABISTIM results:

- early crop with increasing crop level for vegetables - by a factor of 1.2 for garlic, 1.2 for cucumber, 1.3 for pepper, 1.3 for aubergine, 1.4 for cabbage
- increase of crop level for cereals crops - by a factor of 1.2 for wheat, barley, oat
- decrease of diseases action - 100% biological efficiency against dust-brand for barley, 69.4% decrease of covered smut effect for wheat, barley, oat
- decrease of root rot action 75.8% for wheat, 42.5% for barley, 88.6% for oat.

Norm consumption of **ABISTIM** for preplant processing the is 100 ml per ton.

**Patent** 2355170 (RU)





# PIHTOROS+



**PIHTOROS+** - ecologically safe emulsion preparation from natural raw material with growth stimulation and fungicidal action for a large number of agricultural and decorative plants.

The preparation contains fir oil from needles of Siberian fir (1-10%), water-soluble polymer (1-10%) and water (the rest).

**PIHTOROS+ demonstrates:**

- high growth and root formation activity;
- effective protection from 52 to 94% against root rot, dust-brand, powdery mildew, brown rust, helminthes spore disease;
- increase the level of crop yield and plants quality – for cereals crops 62-109%, for vegetables 20 - 80% and 10 - 100% for decorative plants.

**PIHTOROS+** is used for preplant processing, spraying in vegetation period - safe for agrocenosis and human with easy-to-use dosing, low consumption and easy production technology.

**Patent 2443111 (RU)**



# KLIPS (ACIDIC LIPID FRACTION)

**KLIPS** is a composition of biologically active compounds extracted from needles of Siberian fir. **KLIPS** is produced from the waste of lipid fraction.

The preparation demonstrated high efficiencies as growth and immune- stimulating agent for agricultural plants with additional fungicidal activity.

## **KLIPS showed:**

- efficiency for wide range of agricultural plants – pea, garlic, wheat, potato plant;
- increase of seeds germination by 15-50% for agricultural plants;
- suppression of fungous diseases.

Biological activity of **KLIPS** is comparable with widely used preparation NOVOSIL.

**KLIPS** is used as aqueous emulsion with emulsifiers at different concentrations for wetting, preplant processing and spraying at any vegetation period.

**Patent** 2372930 (RU)





# LEOLILA



**LEOLILA** is a new low dose ecological natural preparation for growth stimulation and protection of cereals crops, leguminous plants and vegetables.

**LEOLILA** is biologically active composition of aliphatic and diterpene acids, sterols, diterpene alcohols, and polyprenols with additives as mono- and sesquiterpene compounds produced from Siberian fir.

## The preparation demonstrated:

- high efficiency for increase of crop yield level for cereals crops, leguminous plants and vegetables with fungicidal activity
- growth stimulation and increase crop yield level by 12-116% to total crop level and by 12-283% to early crop
- decrease the agricultural plants morbidity of fungous diseases.

Simple technological process for **LEOLILA** allow large-scale production of the preparation at the fir lumbering waste manufacture.

**Patent** 2437286 (RU)



# LARUS

## (PREPARATION FOR WHEAT PROTECTION)

**LARUS** is a special preparation for effective wheat protection from diseases and for increase the level of crop yield. **LARUS** was developed in cooperation with Siberian Research Institute of Agriculture and Chemicalization of Siberian Branch of Russian Agricultural Academy. The preparation is based on extracts of larch (98.5%), lichen (1%) and special additives (0.5%).

Wide action of the composition allows using it at early period of wheat growing.

### Preplant wheat seed processing shows:

- seed grain enhancement – suppress root rot by a factor of 2.6 , crop yield level increase to 1.6 centner per hectare);
- for spring wheat increase of the ear standing thickness and wheat height in florescence period by 7.4 sm or 12.6%.

### Spraying of the wheat:

- in bushing period results in additional growth of overground mass;
- in ear formation period results in decrease of wheat leaf blotch formation by 62% and increase of the crop yield level by 6 centner per hectare or 30.4%.

**LARUS** consumption during spraying in bushing and formation period is 0.2 liters per hectare.

**Patent** 2464785 (RU)





# BIOFUNGISTIM



**BIOFUNGISTIM** is a preparation for protection of cereals crops from diseases. **BIOFUNGISTIM** contains a composition of phenylpropanoids, sterols, diterpenes from fresh chopped Siberian larch timber.

Results of **BIOFUNGISTIM** tests showed the preparation efficiency for cereals crops like wheat, barley, oat against the following diseases - covered smut, dust-brand, root rot, cormophyte infections.

The developed preparation allows one to simplify of plants processing at preplant period, increase the crops yield level of cereal crops due to growth stimulation and additional diseases protection.

Consumption norm is *100 ml* per ton.

**Patent** 2324352 (RU)



Preparation **BIUS** was developed in the close cooperation with Siberian Research Institute of Agriculture and Chemicalization of Siberian Branch of Russian Agricultural Academy. The preparation is based on natural extracts from the needles of Siberian fir and lichen.

Natural compounds contained in **BIUS** forwards the stress resistance and resistance of plants to extreme environmental conditions. The preparation was tested on wheat and potato plant. Use of **BIUS**.

preparation resulted in the suppression of root rot formation and growth stimulation with the following crop yield level increase by 15 centners per hectare.

**BIUS** showed the outstanding results during testing on potato plant namely increase of healthy tubers formation level by 85 centners per hectare.

**Patent** 2437285 (RU)





# Commercial offer

N.N. Vorozhtsov Novosibirsk Institute of Organic Chemistry of Siberian Branch of Russian Academy of Science offers:

- Partnership aimed to increase of production scale
- Partnership aimed to organize the production of developed preparations on industrial scale
- License agreement



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