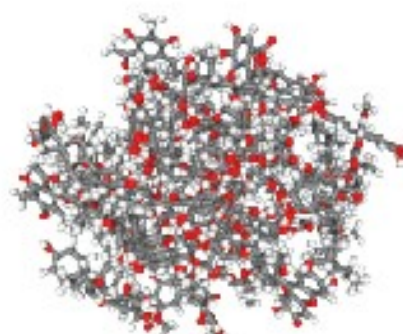


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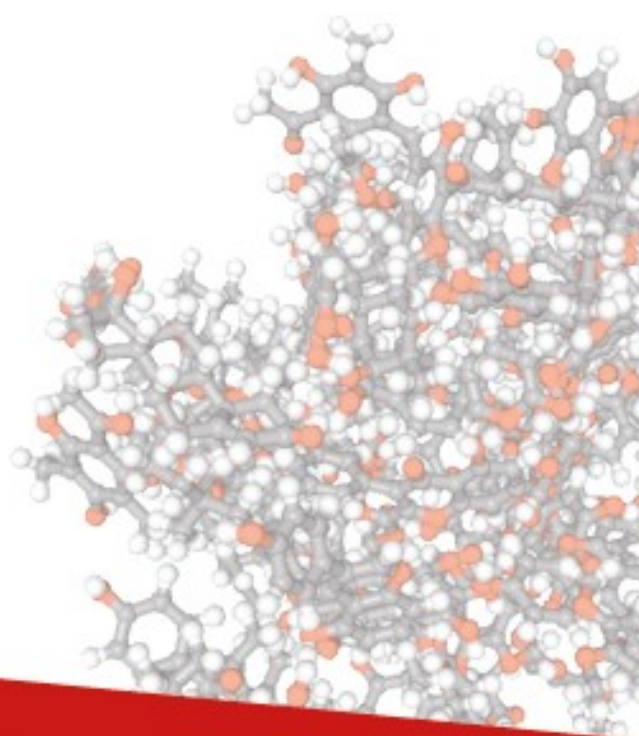
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Seventh International Conference of the CIS IHSS
on Humic Innovative Technologies

**HUMIC SUBSTANCES AND
TECHNOLOGIES FOR RESILIENCE**

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Humic acids isolated from postpyrogenic soils of forest-steppe region: elemental and molecular composition by ^{13}C -NMR spectroscopy

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Keywords: wildfire, postpyrogenic succession, soil organic matter, ^{13}C -NMR spectroscopy, crown fire, surface fire

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Organic matter plays an important role in global carbon cycle of planet. Forest fires are one of the most significant types of disturbances on a global scale, affecting biogeochemical cycles and global warming. Pyrogenic components of soil organic matter are practically not taken into account when assessing the implications of global climate changes on SOM sequestration rate and its stability. Therefore, there are global changes in humosphere under unpredictable fires effect, and fingerprints of this key factor on the molecular structure of SOM is underestimated.

In this regard, both the amount and structural stability of SOM were investigated for postpyrogenic environments of forest-steppe. Mature unaffected by fire Psamment Entisols were studied in comparison with same soil strongly affected by surface and crown fires in 2010 in Tolyatti city. This article discusses postpyrogenic succession in case of comparing results of field works in 2010 with 2020.

The elemental composition of humic acids as well ^{13}C NMR spectra were investigated for studied humic acids. The obtained data clearly show that humic acids in soils of postfire and control plots form rather heterogeneous groups. The main difference in the degree of heterogeneity of HAs groups is the ratio of hydrogen, oxygen and carbon. There is a simultaneous decrease in the H/C and O/C atomic ratios at high temperatures, which indicates a slight loss of oxygen-containing functional groups (moreover, the loss is greater during crown fire), while the aromaticity degree of molecules increases. Changes also occur in the HAs molecules 10 years after the fires, that are manifested mainly in an increase in the content of oxygen-containing groups, which is accompanied by the oxidation of the HA molecule with the same increase in the aromaticity degree of the HA molecule.

Analysis of the ^{13}C -NMR spectra of humic acid from the studied soils made it possible to identify the ranges of chemical shifts belonging to carbon atoms of various functional groups and molecular fragments of HA. Results confirm many studies in this field that the aliphatic part is the main share in the humic acids' composition of non-affected by forest fire soils, while as a result of fires, the aromaticity degree of HAs molecules significantly increases, which is a typical zonal feature of soil organic matter in the forest-steppe zone. Moreover, for the first time ever integrated indicators of HAs molecular composition were presented for postpyrogenic soils. An analysis of integral indicators of the humic substances molecular composition showed that HAs isolated from samples taken in 2020 are generally more mature and resistant to oxidation (including microbial) compared to 2010. This indicates that periodically repeating low-intensity fires in forest-steppe ecosystems can contribute to the accumulation of stable forms of pyrogenic carbon in soils. Therefore, data obtained showed that there are significant changes in structural organization of organic matter as a result of forest fires.

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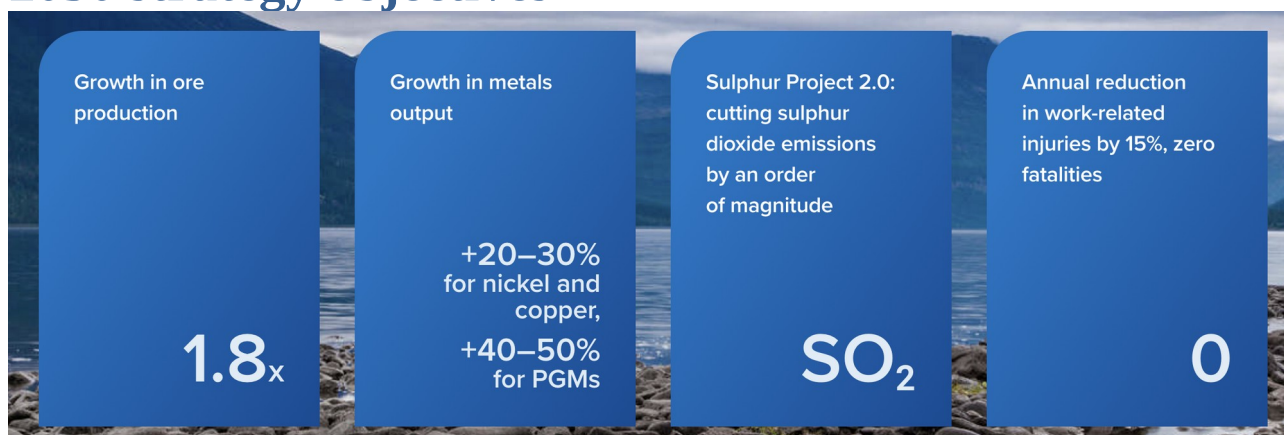
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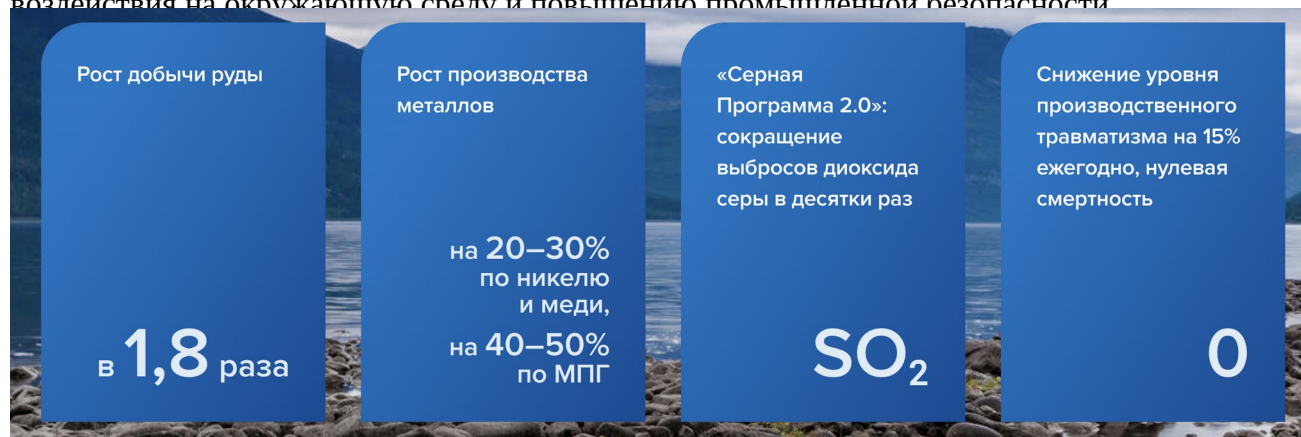
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НОРНИКЕЛЬ

«Норникель» — лидер горно-металлургической промышленности в России и в мире

«Норникель» производит металлы, необходимые для развития **низкоуглеродной экономики и экологически чистого транспорта**. Наш подход эффективно раскрывает потенциал доступных активов. «Норникель» лидирует в отрасли по показателю EBITDA и его рентабельности. Мы — надежный партнер, который обеспечивает устойчивый рост и долгосрочное развитие компании. «Норникель» разработал и реализует **стратегию устойчивого развития до 2030 года**. Она включает долгосрочные цели по объемам добычи и производства, модернизации и расширения перерабатывающих мощностей и топливно-энергетического комплекса, сокращению вредного воздействия на окружающую среду и повышению промышленной безопасности.



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Lignohumate® - helps agribusiness to grow since 1992

Lignohumate® is the brand name for the humic products which are successfully nourishing 15 million hectares of crops. 56% of our products are imported by more than 20 countries, including the Czech Republic, Germany, the Netherlands, the United States and Canada.

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- 100% solubility of dry modifications, lack of insoluble ballast in solutions
- Formulation constancy;
- Up to 90% DM active substances concentration;
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Lignohumate® is a high-tech product of plant raw materials accelerated humification.

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Научно-производственное предприятие «Генезис»
Разработка, производство и внедрение

Научно-производственное предприятие Генезис, расположенное в одном из ведущих центров науки России – Новосибирском Академгородке (Сибирское отделение РАН) является молодой, динамично развивающейся компанией, ведущей свою деятельность с 2016 г.



Основная деятельность компании сосредоточена в направлении создания и производства продуктов для **растениеводства, животноводства и пищевой промышленности**. Мы стараемся налаживать взаимовыгодное сотрудничество с учеными из разных отраслей науки, что обеспечивает нам возможность постоянного совершенствования имеющихся технологий производства, поддержания динамичной работы по созданию новых продуктов и схем их эффективного применения. Наше производство современное, автоматизированное и технологичное. Получение высокоэффективных продуктов основывается на особенном подходе к сырью, уникальности технологии, контроле качества, адаптивности линии к нововведениям.

Эффективность продуктов, выпускаемых компанией подтверждена наукой и практикой. За 6 лет порядка 130 документально подтверждённых результатов применения нашей продукции. Продукты имеют государственную регистрацию РФ, Сербии, Испании,



Узбекистана, Киргизии, и Азербайджана.

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Философия компании «Sib Balance» заключается в том, что лучшая «подпитка» для человека - это природные ресурсы. Компания бережно собирает лучшее, что есть в природе, и соединяет это в своей продукции. В основе каждого продукта лежит четкая технология, современное инновационное оборудование, но главным компонентом является подбор правильных природных ингредиентов.

FitoX - активатор здоровья на основе гуминовых веществ. Работая на клеточном уровне, восстанавливает поврежденные клетки организма, обеспечивает их защиту от окислительного стресса, облегчает течение инфекционных и вирусных заболеваний, помогает быстрому восстановлению, обладает протекторным и антистрессовым действием, эффективен в профилактике возрастных изменений в организме.



Aquasieve - домашний очиститель воды на основе «умного» природного минерала цеолит. При использовании в чайнике или ёмкости с водой, очищает воду и минерализует ее до оптимального уровня, делает воду по свойствам и вкусу близкой к «живой родниковой».

Устройство #ODAVODA фильтрует и обогащает воду минералами, структурирует воду, нормализует pH, делая её «родниковой».

В составе комплекса минералов: мощный природный фильтр — минерал цеолит, а также кремний, янтарь и магний.

Правильная вода всегда с тобой!

ООО «Новолэнд» имеет собственную производственную площадку, которая соответствует требованиям безопасности пищевой продукции ГОСТ Р ИСО 22000-2019, включая принципы ХАССП.

Современное производственное оборудование, произведенное в Италии, Китае, России позволяет изготавливать как тестовые образцы и мини-версии, так и крупные производственные партии.

Разливая продукцию в индивидуальную упаковку, такие как стрип монодозы, ампулы, мы предоставляем возможность нашим клиентам выделиться на фоне своих конкурентов, сэкономить на логистике, выдать потребителю продукт в безопасной, удобной, легкой и индивидуальной упаковке формата «TO-GO».

Вся информация о продуктах <https://sibbalance.com/>

Вся информация об услугах <https://www.nvlnd.ru/>



*Скидка 30% на всю продукцию Sib Balance до 30.12.2022г. на сайте по промо коду: «VODNIK2022».



Sakhalin Humates Group of Companies was established in 2000 and exclusively produces and distributes environmental friendly natural organo-mineral fertilizer Humate Sakhalinsky. The goal of Sakhalin Humates GC is manufacture and development of highly effective and environmental friendly products based on leonardite.

Leonardite mining is carried out on the Sakhalin island, Russian Federation. All stages of extraction and selection of raw materials are carefully monitored by our specialists.



Sakhalin Humate GC products have a high content of humic substances and are available in various formulations (powder, aqueous solution, granules).

Especially for agriculture, the SAKHALIN HUMATES Group of Companies developed Potassium Humate and Sodium Humate.

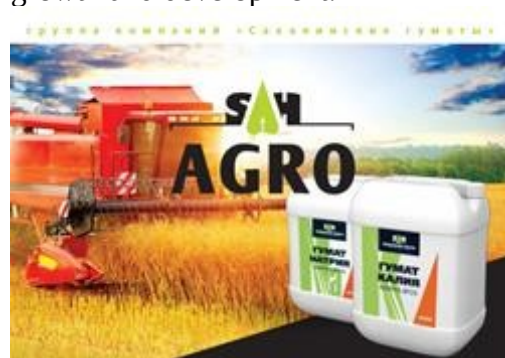
These preparations are produced under the brand name AGRO and are positioned as a line of professional agrochemistry.

Distinctive features of humates of this line are high degree of oxidation of hydrocarbon chains and increased content of low molecular weight humic acids.

Humate "Sakhalinsky" under the AGRO trademark contain an optimum set of microelements in chelated form: silicon, iron, magnesium, sulfur, zinc, cobalt, copper, manganese, etc.

It goes well with fungicides, herbicides, growth regulators, with urea and alkaline microelement solutions.

The preparations have successfully passed a full range of agrotechnical tests and are recommended for widespread implementation, both for reclamation and restoration of depleted and infected lands, and as an effective accelerator of plant growth and development.



The use of humates significantly increases uptake of mineral nutrition and productivity of plants.

The high effectiveness of their use is confirmed both with the facts and figures of scientific reports of the best agricultural chemists and soil scientists of Russia, as well as by the positive reviews of agricultural enterprises that already use Potassium Humate and Sodium Humate ® AGRO. Humate "Sakhalinsky" is fully suitable for organic farming.

Contacts:

www.humate-sakhalin.ru 105082, Russian Federation, Moscow, ul. Bakuninskaya, d. 74-76, building 1, room 29/1328 e-mail: green_island@inbox.ru

Tel / fax: +7 (495) 648-90-55



NL International - международная торговая марка, представленная более чем в 12 странах мира с большой сетью дистрибьютеров и клиентской базой в России. На российском рынке компания работает с 2000 года. В ассортименте NL — более 450 наименований продукции, среди которых функциональное питание, БАД, уходовая и декоративная косметика, средства для ухода за домом.

Собственный производственный комплекс компании расположен на родине бренда в г. Новосибирске и сертифицирован по стандарту ISO 22000 — соответствие международной системе менеджмента в области безопасности пищевой продукции. Сертификацию предприятия проводила SGS – ведущая независимая мировая компания.

В 2022 г. компания получили сертификат GMP – Good Manufacturing Practice. С 2018 г. производство NL имеет сертификат «Халяль», который подтверждает, что компания соответствует исламским требованиям в вопросе производства продукции.

Помимо собственного производства компания осуществляет выпуск продукции на базе независимых изготовителей на территории России, Франции, Германии, Италии, Кореи с полным соблюдением технологических циклов и контролем готовой продукции.

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We are the Regional Chapter of the Commonwealth of Independent States of the International Humic Substances Society (CIS IHSS). The chapter was founded in Zvenigorod, Moscow Region, Russia at the Open Meeting of the Russian IHSS - Chapter held on September 25, 2002. As such, CIS-IHSS is a successor of the Russian IHSS Chapter founded in 1994. The main goal of the CIS IHSS is consolidation of the efforts of the CIS scientists in the field of basic and applied humic research. At present, the CIS IHSS has 150 members and is the largest chapter of the IHSS. The membership includes scientists, students, engineers, practitioners, and business representatives from Belarus, Kazakhstan, Kyrgyzstan, and Russia. Since 2021, CIS members from Ukraine formed a separate national chapter of IHSS - Ukraine Chapter. The scientists and engineers are both from research institutes and industrial firms. The scope of scientific interests includes structure, molecular properties, genesis of humic substances, interactions of humics with heavy metals and organic ecotoxicants, application of humics for remediation technologies, biological activity of humics; technologies of manufacturing and agricultural applications of humics, and others. We are glad to be a part of the world-wide humic research community. We are open for cooperation and any kind of HUMIC activities.

For more information about the CIS IHSS visit our website at <http://www.humus.ru/ihss/>. Information about the IHSS you can find at the website: <http://www.humic-substances.org>

You are very welcome to join us!

Mariya V. Zykova
Regional Coordinator of the CIS IHSS

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