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(54) **Title:** PREPARATIONS PROVIDING A NUTRIENT SOURCE FOR PLANTS AND A PROCESS FOR MAKING SUCH PREPARATIONS

(57) **Abstract**

The invention covers preparations serving as nutrient source of plants and for reducing and tolerating their heavy metal and isotope absorption, as well as for reducing the pesticide volume and also the procedure of turning out such products. As active ingredient, the preparations contain the soluble salts and/or complexes of physiologically important macro and/or micro elements and/or the rocks containing such materials and the abstract of plants containing biocide and/or repellent active ingredient.

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Preparations providing a nutrient source for plants and a process for making such preparations

TECHNICAL FIELD

The invention relates to preparations serving as a nutrient source of plants and for reducing heavy metal and isotope absorption and tolerating injuries brought about by them as well as for reducing the pesticide requirement and a process for the preparation thereof.

BACKGROUND ART

It is well known that in agriculture some preparations containing nutrients to improve the yield are used, such as organic manure, fertilizers, foliar fertilizers as well as large quantities of pesticides which are applied to the plants or their environment, in order to eradicate pests and parasites.

Of these preparations, those containing synthetic active ingredients have numerous side-effects in addition to the desired impact. For example the application of large quantities of fertilizers containing nitrogen, phosphorus and potassium may lead to deficiency symptoms reflecting the lack of micro-elements in plants (S. Kiss: Magnesium fertilizers, magnesium in biology. Agricultural Publishing House, Budapest 1983. W. Bergmann: Occurrence and recognizing of nutrition disturbances in cultivated plants, Agricultural Publishing House, Budapest 1979). This - in addition to retarding the development and growth of plants - also results in the plant generating less growth and development factors (amino-acid, vitamins and enzimes) so important for the human and animal body. Besides, residuals of pesticides may cause different grades and manifestations of poisoning in humans and animals, and they are also the cause of polluting the soil and natural waters.

One of the detrimental side-effects of industrial production is that various pollutants such as heavy metals and acid rain generating gases are introduced into the environment, polluting the lithosphere, the hydrosphere and the atmosphere. The pollutants are introduced through the feeding chain into the human and animal bodies, possibly leading to poisoning and related diseases.

In the operational breakdowns of nuclear power stations or upon experimental nuclear explosions, radio nuclides are introduced into the biosphere. Of these, the ones with a long half-period, such as Sr-90 and Cs-137 could cause radiation diseases for many thousands of years.

Consequently, approaches and preparations are required by which the nutrient demand of plants, animals and people can be met without detrimental side-effects, while reducing the quantity of pesticides applied, along with the heavy metal

and isotope absorption of plants, and facilitating repairing and recovery possesses.

The basis for the invention is the recognition that if the soluble salts and/or complexes of macro and/or micro elements important from a physiologic aspect are applied to the plants or their environment together with the extract of plants containing biocide and/or repellent ingredient, the disadvantages mentioned above can be avoided or mitigated.

Macro-elements important for physiological processes are the chemical elements such as C, O, N, H, P, K, Ca, Mg, S, Si, Na, Cl, Fe and Al occurring in a relatively large quantity in the organic structures of all living creatures.

Physiologically important micro-elements are the chemical elements existing in a very low quantity in the organizations of living creatures, the lack of which, however, causes functional troubles, or toxicity if they are present in a volume higher than required, such as B, Zn, Cu, Mn, Ti, Li, F, Br, Ni, Rb, Sn, Sr, Ba.

Macro and micro elements may also be applied partly or fully in the form of rocks containing such elements.

DISCLOSURE OF THE INVENTION

The subject of the invention covers the preparations serving as a nutrient source for plants, in addition to reducing and helping to tolerate the heavy metal and isotope absorption while decreasing the pesticide volume needed. The active ingredients of these preparations are the soluble salts and/or complexes of physiologically important macro and/or micro elements and/or the rocks containing such materials and the extract of plants containing biocide and/or repellent active ingredient.

We have also found that the impact of preparations can be improved in a target-oriented way, by adding inorganic or organic acids, phytohormons and/or vitamins.

The macro and micro elements of the preparation embodied by the invention are selected according to the requirements of the plants to be treated, as well as taking into consideration the demand of animals and human beings.

The various elements can be applied in the form of their soluble salts and/or complexes. As a complex, especially favourable use can be made of chelates.

As the source of macro and micro elements, the following compounds are listed as examples.

As a nitrogen source, ammonium nitrate or ammonium sulphate can be used. In relation to elementary nitrogen, a percentage by weight of 0.01 to 40 is adjusted.

As a phosphorus source, mono-ammonium-phosphate or super-phosphate (the mixture of calcium phosphate and calcium phosphate) may be applied, when converting the total phosphorus concentration of the preparation to elementary phosphorus, a per cent by weight of 0.01 to 40 is adjusted.

As a potassium source, potassium sulphate, potassium nitrate, potassium acetate, potassium ammonium nitrate or potassium chloride can be used, when converting the total potassium concentrate of the prepration to elementary potassium, a per cent by weight of 0.01 to 40 is adjusted. As a calcium source, calcium nitrate, calcium hydrogen phosphate, calcium pyro-phosphate, calcium magnesium carbonate, calcium glyconate, calcium citrate and calcium lactate are identified, when converting the total calcium concentration of the preparation to elementary calcium, the

per cent by weight is 0.01 to 20.

As a magnesium source, magnesium sulphate, magnesium carbonate or calcium-magnesium carbonate may be used, when the total magnesium concentration of the preparation converted to elementary magnesium is a percentage by weight of 0.01 to 20.

A suitable manganese source is manganese sulphate, manganese metaborate, manganese-nitrate, manganese-chelates, when converting the total manganese concentration of the preparation to elementary manganese, the percentage by weight is 0.005-30.0. As a molibdenum source, ammonium molibdenate can be applied, when converting the total molibdenum concentration of the preparation to elementary molibdenum, the percent by weight is 0.001 to 10.

A suitable copper source is copper(II)sulphate, copper(II)nitrate, copper(II)acetate or copper-amine complexes, copper(II)amine-sulphate, and when converting the total copper concentration of the preparation to elementary copper, the per cent by weight is 0.001 to 10.

As a zinc source, zinc sulphate and zinc-amine complexes are described, when converting the total zinc concentration of the preparation to elementary zinc, the per cent by weight is 0.05 to 20.

As a boron source, boric acid or borax may be used, when converting the total boron concentration of the preparation to elementary boron, the per cent by weight is 0.05-10.

A suitable gallium source is gallium chloride and when converting the total gallium concentration to elementary gallium, the per cent by weight is 0.01 to 10.

As a lithium source, lithium nitrate can be used, when the total lithium concentration of the preparation converted to elementary lithium is a percentage by weight of 0.005 to 4.

As a cobalt source, cobalt carbonate and cobalt chlorite can be used, when the total cobalt concentration of the preparation converted to elementary cobalt is a per cent by weight of 0.05 to 4.

A suitable titanium source is titanium dioxide, which is taken into solution in the form of colloide, or titanium sulphate, when the total titanium concentration of the preparation converted to elementary titanium is a per cent by weight of 0.001 to 10.

As an iron source, iron(III)sulphate or iron-chelates can be used, when the total iron concentration of the preparation converted to elementary iron is a percentage by weight of 0.005 to 30.

Certain salts and complexes may serve simultaneously as the source of several macro and micro elements. Thus for example superphosphate is simultaneously a calcium, magnesium and phosphorus source, ammonium molibdenate is a nitrogen and molibdenum source, and certain nitrates are not only metal but also nitrogen sources.

If the necessary elements are used in the form of rocks, as examples the following are listed.

As a nitrogen source, nitro calcite or strewite, as a phosphorus source, fluor apatite, isokite, brushite, kutnohorite, or phosphorit, as a potassium source, potassium nitrate, kanelite, cryptomelane, langbeinit, kainite or polyhalite can be used.

As a calcium source, the following are appropriate: dolomite, akermanite, andradite, brushite, monetite, alstonite, aragonite, fassaite, herderite, huntite, kalcite. laitarite, monticellite, oldhamite, perovskite, polyhalite, powellite, scholzite, or fairfieldite, as a magnesium source dolomite, ankerite, epsomite, magnesite, pentahydrite, armalcolite, bischofite, faheyite, geikielite, kieserite, kutnahorite, polyhalite, todorokite or strewite, while as a manganese source, the following can be applied: mallardite, ludlamite, graphtonite, jakobsite, kutnahorite, pyrophanite, smikite, or crednerite.

Suitable molibdenum sources are molibdenite, powellite, or drysdallite, a copper source is kalkantite, crednerite, delafossite and pisanite, and zinc source is zincite, franklinite, hetaerolite, matraite. scholzite, willemite, and gaslarite.

As a boron source, borax, boracite, colemanite, inyoite, priceite, warwikite and sassoline, as a gallium source gallite, as a lithium source trifiline, as a cobalt source sphero cobaltite and as a titanium source ilmenite, armalcolite or geikielite may be used.

As an iron source, ilmenite, trifiline, cubanite, heterosite, melonteritote, rosenitote, strengite, somolnokite, vivanite or pisanite may be applied.

A sitable stroncium source is celestite and stroncianite.

Plants containing biocide and/or repellent active ingredient are plants which contain pesticide, such as bactericide, viricide, insecticide, fungicide, miticide or vermicide or repellent materials.

As examples for such plants, the following are mentioned:

mustard (Brassica juncea Czern.) absinth (Artemisia absinthium L.), chamomile (Matricaria chamomilla L.), calendula (Calendula officinalis L.), thyme (Thymus vulgaris L.), horsetail (Ephedra equisetine Bge.), borago (Borago officinalis L.), caraway (Carum carvi L.), black radish (Raphanus sativum), quince (Cydonia oblonga Mill.), rose (Rosa L.), sage (Lepidium sativum L.), walnut (Juglans regia L.), ricinus (Ricinus communis L.) paprika (Capsicum annua L.), mallow (Althaea officinalis L.), hyppophae (Hyppophae rhamnoides L.), celery (Apium gravedens L.), normal sage (Salvia officinalis L.), bidens (Bidens tripartitus L.), abutilon (Abutilon Adans), chrysanthenum (Chrysenthenum vulgare L., Phyrethrum Bois.), lavender (Lavendula officinalis L.), buckwheat (Fagopyrum Geartu.), St.John's wort (Hypericum perforatum), horse radish (Verbascum thapsiforme), plantain (Plantago major L.), anise (Pimpinella anisum L.), aloe (Aloe arborescens Mill.), rhubarb (Rhenum officinale), garlic (Allium sativum L.), nettle (Urtica dioica L.).

Plant extracts applicable as components of the preparations embodied by the invention are available from trade or they can be produced by extraction, vapour distillation and/or pressing of the plant organs containing the active ingredient, for example the flower, leaves, root, berries or seed.

The plant extracts available from trade include the active ingredients of one or more plants. Such abstracts are for example the products marketed under the names Aromex and Fresta.

Extraction may be carried out by an organic extracting agent, for example by alcohol, some kind of an oil or acid or by the mixtures of these.

As mentioned above, the effect of the preparations embodied by the invention may be enhanced by adding inorganic or organic acids, phytohormons and/or vitamins.

Such inorganic or organic acids can be used which do not harm the plants in the concentration applied.

A further advantage of using inorganic or organic acids is that they shift the pH rate of the preparation to the acid range, and as a result the nutrient absorption of plants to be treated is enhanced.

An inorganic acid that can be applied beneficially is phosphoric acid, while as an organic acid, lactic acid, citric acid, malic acid, butanedioic acid, acetic acid etc. can be applied.

Phytohormons and vitamins are also boosting agents. As phytohormons, it is advantageous to use auxins, gibberellines, cytokinins, abscisic acid and ethylene. As vitamins, advantageous use can be made of thiamine-hydrochloride, aneurin, pyridoxine and nicotine acid. The quantity of these materials amounts to between 1 μg and 50 g per one litre of the preparation.

For the preparations embodied by the invention, if necessary suspending agent such as bentonite, alginite or vinace is added. The latter materials partly improve the viscosity of the preparation and partly increase the active colloide surface of the preparation. The retarded effect of the preparation is ensured by the absorbed cations on the surface of the colloides.

The accurate composition of the preparation embodied by the invention is selected according to the objective to be accomplished.

If the preparation is used as a plant nutrient, through their application the mineral content of plants can be increased in a target-oriented way, meaning the iron, calcium, magnesium, copper, selenium or zinc content. In this way, in addition to increasing the plant yield, it better corresponds to the mineral requirement of the person or the animal species to be fed.

To supply pregnant women and small children, for example, vegetables and fruit with a high iron content can be produced. This can be achieved by spraying the vegetables and fruit with a high iron content preparation.

Lucern intended to feed high milking capacity cattle for example is sprayed with a high calcium and magnesium preparation and so the fodder will also have a higher calcium and magnesium content.

If the preparation embodied by the invention is intended for reducing and tolerating the heavy metal absorption of plants, first soil and plant analysis is carried out, i.e. it is determined what heavy metals are present, and in which concentration and form. In the knowledge of these factors is the composition selected and such a preparation is produced which has a high calcium and magnesium content and a significant micro-element content. When plants are sprayed with such a preparation, the plant organs above the soil are saturated with calcium, magnesium and micro elements, thereby antagonizing (reducing) the absorption of heavy metals and facilitating the toleration of the plant. The micro elements phytohormons and/or vitamins in the preparation boost the enzyme activities of the plants, thereby contributing to tolerating heavy metal pollution.

If the preparation embodied by the invention is designed to

reduce and tolerate isotope absorption by the plants, again soil and plant analysis precedes the selection of composition. Once this information is gathered, we can increase in the preparation the concentration of the stable forms of polluting isotope(s) or that of the antagonist isotopes. Thus, for example in the case of Sr-90, we increase the concentration of calcium and magnesium and also that of stable stroncium, in the case of Cs-137 the concentration of potassium, calcium and magnesium and in the case of J-131 that of stable iodine is increased. At the same time, we also enhance the concentration of elements able to change their
valence (e.g. copper, manganese, iron) and B-vitamins and phytohormons to encourage the processes of rerairing and recovering the damage caused by radiation.

The plant extracts applied in the preparations embodied by the invention - in addition to exerting a biocide effect themselves, thus reducing the necessary quantity of other pesticides, also assist the nutrient uptake of plants.

The preparations embodied by the invention are produced in the following way.

To the biocide effect plant extract or to the mixture of multi biocide effect plant extracts, the salts and/or complexes of macro and micro elements selected according to the purpose to be achieved are added, and then the mixture is supplemented as required by one or more phytohormon and/or vitamin and/or inorganic or organic acid and if necessary also by a suspending agent.

If the macro and micro elements are used in the form of rocks, one or more rocks selected on the basis of its nutrient content are crushed to 1 nm - 10 mm size, and this is added to the plant extract(s) of biocide effect.

If only a part of the macro and micro elements is applied in the form of rocks, the lacking nutrients are supplied by their salts or complexes.

DETAILED DESCRIPTION OF EXAMPLES

The invention is demonstrated by way of the following examples.

Example 1

Producing foliar fertilizer serving as a nutrient source. The water, alcohol or oil based extracts of the following plants are mixed:

marigold	2.00 litres
horsetail	5.00 litres
sage	10.00 litres
Fresta 1000	2.00 litres
Aromex	0.50 litres
Thyme oil (oleum thymi)	0.50 litres
nettle	3.00 litres
pyretrum extract	1.50 litres
nicotine	0.50 litres
quassia chips	0.50 litres
vinace	2.00 litres

The mixture is diluted to 100 litres by water, and then the following components are added into a 20-litre volume of the compound, while performing agitation:

ammonium nitrate	20.00 kg

superphosphate	10.00 kg
potassium sulphate	20.00 kg
calcium nitrate	10.00 kg
copper-tetramine-complex	5.00 kg
magnesium sulphate	5.00 kg
iron (III) sulphate	2.00 kg
manganese-sulphate	0.50 kg
zinc-hexamine complex	0.50 kg
ammonium molibdenite	0.01 kg
lithium nitrate	0.01 kg
borax	1.00 kg
bentonite	1.00 kg

Finally, the volume of the mixture is made up to 100 litres, by means of the compound consisting of plant extracts.

By diluting to 0.01 to 30 per cent by volume, the foliar fertilizer concentrate so obtained can be used for supplementing the N, P,. K, Ca, Mg, Fe, Cu, Mn and B nutrients of plants.

Example 2

Producing foliar fertilizer for reducing heavy metal absorption.

When producing foliar fertilizer for reducing zinc absorption, the zinc salts and complexes are left out of the nutrients and the calcium, magnesium and micro-element content of the product is increased.

The extracts of the following plants are mixed:

celery	2.00 litres
rhubarb	5.00 litres

black radish	5.00 litres
garlic	5.00 litres
lavender	10.00 litres
Fresta 1000	2.00 litres
caraway seed	1.50 litres
ricinus	1.50 litres
vinace	2.00 litres

The mixture is diluted to 100 litres by water, and then the following components are added to a 20-litre volume of the compound while agitating:

ammonium nitrate	20.00 kg
superphosphate	10.00 kg
potassium sulphate	20.00 kg
calcium nitrate	15.00 kg
magnesium sulphate	10.00 kg
iron(III)sulphate	2.00 kg
manganese-sulphate	0.50 kg
zinc-hexamine complex	0.50 kg
ammonium molibdenite	0.01 kg
lithium nitrate	0.01 kg
borax	1.00 kg
bentonite	1.00 kg

And finally the volume of the mixture is made up to 100 litres, with the compound consisting of plant extracts.

By diluting to 0.01 to 30 per cent by volume the so obtained foliar fertilizer concentrate, it can be used for supplementing the N, P, K. Ca, Mg, Fe, Mn and B nutrients of plants and for reducing the zinc absorption and tolerate the excess zink taken up.

Example 3

Producing a foliar fertilizer aimed at reducing the absorption of Sr-85 and Sr-90 isotopes and for rehabilitating damage caused by radiation.

The extracts of the following plants are mixed:

chamomile	2.00 litres
rhubarb	5.00 litres
garlic	10.00 litres
Fresta 1000	2.00 litres
Aromex	1.50 litres
horsetail	2.00 litres
mustard seed	3.00 litres
vinace	5.00 litres

The mixture is diluted to 100 litres of water and then the following components are added to a volume of 20 litres of this compound, while agitating:

superphosphate	20.00 kg
potassium sulphate	15.00 kg
calcium nitrate	25.00 kg
copper tetramine complex	1.00 kg
magnesium sulphate	15.00 kg
iron(III)sulphate	2.00 kg
manganese-sulphate	0.50 kg
zinc-hexamine complex	0.50 kg
ammonium molibdenite	0.01 kg
lithium nitrate	0.01 kg
borax	1.00 kg
bentonite	1.00 kg

Finally, the volume of the mixture is supplemented to 100 litres by the compound consisting of plant extracts.

By diluting the foliar fertilizer concentrate so obtained, it can be used for supplementing the N, P, K, Ca, Mg, Fe, Cu, Mn and B nutrients of plants and for reducing the absorption of Sr isotopes.

Example 4

Producing a foliar fertilizer for reducing the absorption of Cs-134 and Cs-137 isotopes.

The extracts of the following plants are mixed:

chamomile	2.00 litres
rhubarb	5.00 litres
garlic	10.00 litres
horse radish	3.00 litres
anise	1.00 litres
St John's wort	1.50 litres
Fresta 1000	2.00 litres
Aromex	1.50 litres
vinace	5.00 litres

The mixture is diluted to 100 litres by water, and then the following components are added to a 20-litre volume of the compound, while agitating:

superphosphate	20.00 kg
potassium sulphate	30.00 kg
calcium nitrate	15.00 kg
copper tetramine complex	1.50 kg
magnesium sulphate	20.00 kg
iron(III)sulphate	2.00 kg
manganese-sulphate	0.50 kg
zinc-hexamine complex	0.50 kg

ammonium molibdenite	0.01 kg
lithium nitrate	0.01 kg
borax	1.00 kg
bentonite	1.00 kg

Finally, the volume of the mixture is supplemented to 100 litres by the compound consisting of plant extracts.

By diluting the foliar fertilizer concentrate so obtained, it can be used for supplementing the N, P, K, Ca, Mg, Fe, Cu, Mn and B nutrients of plants and for reducing the absorption of Cs isotopes.

Example 5

Producing a foliar fertilizer for reducing the absorption of J-131 isotope.

The extracts of the following plants are mixed:

chamomile	2.00 litres
walnut shell	4.00 litres
mallow	2.50 litres
black radish	5.00 litres
lavender	0.50 litres
rhubarb	5.00 litres
garlic	10.00 litres
Fresta 1000	2.00 litres
Aromex	1.50 litres
vinace	5.00 litres

The mixture is diluted to 100 litres by water, and then the following components are added to a 20-litre volume of the compound, while agitating:

superphosphate	20.00 kg
potassium sulphate	15.00 kg
calcium nitrate	25.00 kg
copper tetramine complex	1.00 kg
magnesium sulphate	15.00 kg
iron(III)sulphate	2.00 kg
manganese-sulphate	0.50 kg
potassium iodide	1.50 kg
iodine	0.75 kg
zinc-hexamine complex	0.50 kg
ammonium molibdenite	0.01 kg
lithium nitrate	0.01 kg
borax	1.00 kg
bentonite	1.00 kg

Finally, the volume of the mixture is supplemented to 100 litres by the compound consisting of plant extracts.

By diluting the foliar fertilizer concentrate so obtained to 0.01 to 10 per cent by volume, it can be used for supplementing the N, P, K, Ca, Mg, Fe, Cu, Mn and B nutrients of plants and for reducing the absorption of iodine isotope.

Example 6

Producing a foliar fertilizer supplemented with acid.

To 100 litres of the preparation as per example 1, lactic acid of 5 per cent by volume is added.

The preparation so produced facilitates the nutrient absorption of plants, and the active ingredients of plant extracts are activated.

Example 7

Producing of foliar fertilizer supplemented with vitamins.

To 100 litres of the preparation as per Example 1, the following vitamins are added:

Vitamin B	10.5 g
Vitamin B2	1.0 g
Vitamin B6	2.0 g

The plants make better use of the nutrients in the preparation so obtained, and through the application of this mixture, the repairing and recovery processes of poisoning by heavy metal absorption and radiation damage are accelerated in plants.

Example 8

Producing of foliar fertilizer supplemented with phytohormons.

To 100 litres of the preparation as per Example 2, the following phytohormons are added:

naphthil-acetic acid	5.0 g
gibberelline (GA_3)	20.0 g
nicotine acid	1.0 g
kinetine	3.0 g

The nutrients of the preparation so obtained are better

utilized by the plants, and through its application the reparation processes of plants as a result of poisoning by heavy metal absorption and radiation damage are accelerated.

Example 9

Producing foliar fertilizer supplemented with vitamins and phytohormons.

To 100 litres of the preparation as per Example 1, the following vitamins and phytohormons are added:

Vitamin B1	0.5 g
Vitamin B2	1.0 g
Vitamin B6	2.0 g
α-indolil-acetic acid	5.0 g
gibberelline (GA_{10})	20.0 g
nicotine acid	1.0 g
kinetine	3.0 g

The nutrients of the preparation so obtained are better utilized by the plants, and through its application the repairing processes of plants as a result of poisoning by heavy metal absorption and radiation damage are accelerated.

Example 10

Producing foliar fertilizer serving as the nutrient of plants, through the use of rocks.

chamomile extract	2.00 litres
rhubarb extract	5.00 litres
marigold extract	1.50 litres
walnut extract	0.50 litres
garlic extract	10.00 litres

paprika extract	4.00 litres
Fresta 1000	2.00 litres
Aromex	0.50 litres
mallow extract	0.10 litres
hippophae leaf extract	0.50 litres
celery extract	1.00 litres
caraway seed extract	1.50 litres
plantain extract	1.50 litres
St John's wort extract	0.80 litres
horse radish root extract	1.00 litres
thyme oil (oleum thymi)	0.50 litres
nettle extract	2.00 litres
pyretrum extract	0.50 litres
quince extract	0.50 litres
nicotine	0.50 litres
quassia chips extract	0.50 litres
ricinus extract	1.00 litres
buckwheat extract	2.50 litres
vinace	2.00 litres

This mixture is diluted to 100 litres by water, and then the following crushed rocks are added to a 20-litre volume of the compound, while agitating:

nitrocalcite	15.00 kg
strewite	10.00 kg
brushite	15.00 kg
isokite	12.00 kg
potassium nitrate	20.00 kg
dolomite	18.00 kg
mallardite	1.00 kg
powellite	1.50 kg
pisanite	2.50 kg
zincite	2.50 kg
gallite	0.50 kg
trifiline	0.50 kg

spherocobaltite	0.25 kg
ilmenite	0.25 kg
bentonite	1.00 kg

Let the mixture stand for seven days.
When the preparation so produced is diluted to 0.1 to 50 per cent by volume, it can be used for supplementing the N, P, K, Ca, Mg, Fe, Cu, Mn nutrients of plants.
The efficiency of preparations embodied by the invention is demonstrated by the following experiments:

Experiment A

Testing of nutrient content in wheat
The wheat variety Mv 16, was treated in 2-3 leaf condition with the preparation as per example 1, diluted to 1 %, 5 % and 10 % concentration (A, B, C). As a reference, untreated plants were used.
In 3-4 leaf condition we have determined the nutrient content of the leaves. The results are given in the following Table I.

Experiment B

Testing of nutrient content in wheat.
The wheat variety Mv 15, was treated in 2-3 leaf condition with a preparation as per example 10, diluted 1%, 5% and 10% concentration (A, B, C). As a reference, untreated plants were used.
In 3-4 leaf condition we have determined the nutrient content of the leaves. The results are given in the following Table II.

Table I

Treatment	Concentration (mg/kg)					
(%)	Ca	Mg	Fe	Cu	Zn	Mn
Reference	20240.0 ± 957.6	1725.0 ± 61.3	107.6 ± 6.4	12.4 ± 0.4	44.6 ± 2.1	217.5 ± 38.9
A	21424.6 ± 1290.0	1850.0 ± 107.5	114.1 ± 9.6	18.3 ± 0.5	47.2 ± 2.3	174.3 ± 6.7
B	19025.0 ± 433.7	1975.0 ± 91.9	161.7 ± 6.3	43.2 ± 6.2	120.6 ± 3.1	206.4 ± 10.2
C	28250.0 ± 591.6	2600.0 ± 72.9	251.5 ± 6.2	147.6 ± 2.8	290.4 ± 3.5	365.8 ± 28.3

Table II

Treatment	Concentration (mg/kg)					
(%)	Ca	Mg	Fe	Cu	Zn	Mn
Reference	21375.0 ± 767.5	2025.0 ± 91.9	112.5 ± 2.9	6.7 ± 0.4	73.7 ± 2.3	148.1 ± 10.3
A	20750.0 ± 459.3	2250.0 ± 68.5	130.90 ± 1.9	16.7 ± 0.6	96.4 ± 3.3	202.5 ± 15.2
B	22825.0 ± 396.5	2950.0 ± 134.6	57.7 ± 0.5	52.9 ± 0.7	205.3 ± 3.7	278.2 ± 13.4
C	23700.0 ± 865.7	2665.5 ± 47.2	49.6 ± 4.3	139.6 ± 3.2	359.4 ± 5.4	372.8 ± 15.8

Experiment C

Testing the reduction of SR-85 activity on bean plants.
Two-week old bean plants which absorbed SR-85 isotope from the soil were treated with a preparation as per example 3, diluted to 5 % concentration.
When the age reached 4-weeks, we have re-measured the Ns-85 activity of the plants. The results obtained are summarized in the following Table III.

Table III

	Sr-85 activity (Bq/g)	In a percentage of the reference
Before treatment (reference)	8.12 ± 0.59	100.0
After treatment	7.21 ± 1.06	88.79

Experiment D

Testing of nutrient content on tomatoes.
Tomato berries in green phenological state were treated with preparation A as per example 7, diluted to 10 %, and then in ripe phenological condition we have also determined the nutrient content of the berries.
The results achieved are given in Table IV.

Experiment E

Testing of nutrient content on grapes.
At the time of the bursting of the buds we have determined the nutrient content of the leaves of Ezerjó (Thousand goodies) grape variety and the plants were treated with the preparation as per example 9, diluted to 1%, 5% and 10% concentration (A, B and C).
At the time when the berries were ripe, we have re-determined the nutrient content of leaves. The results obtained are given in Table V.

Experiment F

Treatment of sugar-beet.
In 3-5 leaf state we have determined the Fe, Zn, and Mn content of the leaves of Beta-poly 1 sugar beet hybride, and then the plants were treated with the preparation as per Example 2.
In 5-7 leaf state we have re-measured the Fe- Zn and Mn content of the leaves. The results obtained are indicated in the following Table VI.

Table IV

Treatm.	Concentration (mg/kg)					
(litre/ha)	Ca	Mg	Fe	Cu	Zn	Mn
Reference	1753.0 ± 203.0	2031.0 ± 118 9	57.1 ± 6.7	6.9 ± 0.9	25.7 ± 2.6	57.6 ± 3.7
A.	2392.7 ± 173.7	2200.0 ± 187.0	76.5 ± 8.8	15.5 ± 1.8	30.5 ± 2.5	75.1 ± 7.9

Table V

Treatment	Concentration (mg/kg)				
(%)	Ca	Mg	Fe	Zn	Mn
Reference	7636.7 ± 103.9	3070.0 ± 67.3	164.2 ± 16.6	19.5 ± 0 6	50 5 ± 1.0
A	8326 7 ± 512 8	4292.5 ± 418.6	222.8 ± 10.1	102.9 ± 28.5	129.5 ± 23.5
B	9253.3 ± 611.3	4292 3 ± 237 5	238 8 ± 17.9	120.7 ± 48.7	156.4 ± 37.9
C	9376 7 ± 705 4	4275 8 ± 97.2	188 3 ± 9 2	101.3 ± 35.6	131 9 ± 33.9

Table VI

Treatment	Concentration (mg/kg)		
Combinations	Fe	Zn	Mn
Reference	1167.0 ± 85.4	57.3 ± 11.4	408.6 ± 11.0
1	926.4 ± 102.2	36.4 ± 1.3	318.2 ± 18.3
2	909.6 ± 104 4	40.3 ± 2.8	359.2 ± 10.9
3	737.6 ± 32.0	34 3 ± 0 7	356.8 ± 17.5
4	677 8 ± 28 6	34 7 ± 1 4	360 6 ± 18 9

CLAIMS

1. A preparation serving the purposes of providing a nutrient source for plants and of reducing and tolerating the heavy metal and isotope absorption of and injuries caused by them to plants, characterized in that as active ingredients the preparation contains soluble salts of physiologically important macro and/or micro elements and/or complexes and/or rocks including the same, and said preparation further containing extracts of plants containing biocide and/or repellent active ingredient.

2. The preparation as claimed in claim 1, characterized in that as a nitrogen source it contains some kind of a soluble ammonium compound or nitrate, preferably ammonium nitrate or ammonium sulphate.

3. The preparation as claimed in claim 1, characterized in that as a phosphorus source it contains some kind of a soluble phosphate, preferably mono-ammonium phosphate or superphospate.

4. The preparation as claimed in claim 1, characterized in that as a potassium source it contains some kind of a soluble potassium salt, preferably potassium sulphate, potassium nitrate, potassium acetate or potassium chloride.

5. The preparation as claimed in claim 1, characterized in that as a calcium source it contains some kind of a soluble calcium salt, preferably calcium nitrate, calcium hydrogen phosphate, calcium pyrophosphate, calcium citrate, calcium glyconate, calcium lactate or calcium magnesium carbonate.

6. The preparation as claimed in claim 1, characterized in that as a magnesium source it contains some kind of a

soluble magnesium salt, preferably magnesium sulphate, magnesium carbonate or calcium magnesium carbonate.

7. The preparation as claimed in claim 1, characterized in that as a manganese source it contains some kind of a soluble manganese salt, preferably manganese sulphate, manganese metaborate, manganese nitrate or manganese chelate.

8. The preparation as claimed in claim 1, characterized in that as a molibdenum source it contains some kind of a soluble molibdenum salt, preferably ammonium-molibdenate.

9. The preparation as claimed in claim 1, characterized in that as a copper source some kind of a copper salt, preferably copper sulphate, copper-nitrate, copper-acetate or copper-amine complex is included.

10. The preparation as claimed in claim 1, characterized in that as a zinc source it includes some kind of a soluble zinc salt, preferably zinc sulphate or zinc hexamine complex.

11. The preparation as claimed in claim 1, characterized in that as a boron source it includes some kind of a boric acid or soluble boron salt, preferably borax.

12. The preparation as claimed in claim 1, characterized in that it includes as a gallium source some kind of a soluble gallium salt preferably gallium chloride.

13. The preparation as claimed in claim 1, characterized in that as a lithium source, some kind of a soluble lithium salt, preferably lithium nitrate is included.

14. The preparation as claimed in claim 1, characterized in that as a cobalt source, it includes some kind of a soluble cobalt salt, preferably cobalt carbonate or cobalt chloride.

15. The preparation as claimed in claim 1, characterized in that as a titanium source, it includes titanium dioxide.

16. The preparation as claimed in claim 1, characterized in that as an iron source, it includes some kind of a soluble iron (III) salt, preferably iron (III) sulphate or iron kelates.

17. The preparation as claimed in claim 1, characterized in that as a nitrogen source it includes some kind of nitrogen-containing rocks, preferably nitro-calcite or strewite.

18. The preparation as claimed in claim 1, characterized in that as a phosphorus source, it includes some kind of phosphorus containing rocks, preferably fluor apatite, isotite, brushite, kutnohorite or phosphorite.

19. The preparation as claimed in claim 1, characterized in that as a potassium source it includes some kind of potassium containing rocks, preferably potassium nitrate, karnallite, cryptomelane, langbeinite or kainite.

20. The preparation as claimed in claim 1, characterized in that as a calcium source it includes some kind of calcium-containing rocks, preferably dolomite, akermanite, andradite, brushite, monetite, alstonite, aragonite, fassaite, herderite, huntite, calcite, lautarite, monticellite, oldhamite, perovskite, polyhalite, powellite, scholzite or fairfieldite.

21. The preparation as claimed in claim 1, characterized in that as a magnesium source it includes some kind of magnesium containing rocks, preferably dolomite, ankerite, epsomite, magnesite, pentahydrite, armalcolite, bischofite, fajheyite, geikielite, kieserite, kutnahorite, polyhalite, strevite, todorokite, or strewite.

22. The preparation as claimed in claim 1, characterized in that as a manganese source it includes some kind of manganese containing rocks, preferably mallardite, ludlamite, graphtonite, jakobsite, kutnahorite, pyrofanite, smikite or crednerite.

23. The preparation as claimed in claim 1, characterized in that as a molibdenum source it includes some kind of molibdenum containing rocks, preferably molibdenite, drysdallite, or powellite.

24. The preparation as claimed in claim 1, characterized in that as a copper source it includes some kind of copper containing rocks, preferably calcantite, credrenite, delafossite, or pysanite.

25. The preparation as claimed in claim 1, characterized in that as a zinc source it includes some kind of zinc containing rocks, preferably zincite, franklinite, hataerolite, matraite, scholzite, willemite or gaslarite.

26. The preparation as claimed in claim 1, characterized in that as a boron source some kind of boron containing rocks preferably borax, boracite, colemanite, inyotite, priceite, warwicite or sassoline is included.

27. The preparation as claimed in claim 1, characterized in that as a gallium source some kind of gallium containing rocks is included, preferably gallite.

28. The preparation as claimed in claim 1, characterized in that as a lithium source some kind of lithium containing rocks are included, preferably trifiline.

29. The preparation as claimed in claim 1, characterized in that as a cobalt source some kind of cobalt containing rocks, preferably spherocobaltite is included.

30. The preparation as claimed in claim 1, characterized in that as a titanium source some kind of titanium containing rocks, preferably armalcolite, geikielite or ilmenite is included.

31. The preparation as claimed in claim 1, characterized in that as an iron source some kind of iron containing rocks, preferably ilmenite, trifiline, cubanite, heterosite, melonterite, rosenite, strengite, somolnokite, vivianite or pisanite is included.

32. The preparation as claimed in claim 1, characterized in that as a plant extract containing biocide and/or repellent active ingredient, the extract of plants containing pesticide such as bactericide, viricide, insecticide, fungicide, miticide or vermicide or repellent materials are included.

33. The preparation as claimed in claim 1, characterized in that as a plant extract containing biolcide and/or repellent active ingredient, the extract of the following plants is included: mustard, wormwood, chamomile, marigold, thyme, horsetail, sage, lavender, nettle, rhubarb, cselery borago, walnut, paprika, cress, quince, mallow, ricinus, hippophae, rose, black radish, tansy, lavender, caraway, buckwheat, St. John's wort, horse radish, plaintain, anise, aloe, normal mallow, bidens and/or garlic.

34. The preparation as claimed in claim 1, characterized in that it includes some kind of an inorganic or organic acid not harming the plants.

35. The preparation as claimed in claim 34, characterized in that as an acid it includes phosphoric acid, lactic acid, citric acid, malic acid, tartaric acid or acetic acid.

36. The preparation as claimed in claim 1, characterized in that it includes one or more vitamins and/or plant hormons.

37. The preparation as claimed in claim 36, characterized in that as a vitamins it includes thyamine-hydrochloride, aneurine, pyridoxine and/or nicotin acid and as phytohormons auxines, giberrelines, cytokinins, abscisic acid and/or ethylene.

38. A process to produce preparations serving as nutrient source for plants and capable of reducing and tolerating the heavy metal and isotope absorption of plants and repairing the injuries caused by them, as well as for reducing the pesticide volume, characterized in that to the biocide effect plant extract or to the mixture of extracts of many biocide effects plants, the salts and/or complexes of macro and micro elements selected according to the purpose to be achieved and/or the rock(s) crushed as necessary and containing these materials, followed by the supplementing of the mixture in the desired case by one or more phytohormon and/or vitamin and/or inorganic or organic acid and if necessary by a suspending material.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/HU 94/00045

A. CLASSIFICATION OF SUBJECT MATTER

IPC[6]: C 05 D 9/02; C 05 G 3/02
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC[5]: C 05 D 9/00, 9/02; C 05 G 3/00, 3/02; A 01 N 65/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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