

NUTRIENT SOLUTIONS

[0001] Priority is claimed for European patent application No. 23 194 896.9 dated September 1, 2023.

[0002] The invention relates to a nutrient combination for the soilless cultivation of plants, in particular in vertical farming over at least two levels, preferably at least three levels, comprising at least nitrogen, phosphorus, potassium, sulphur, calcium, magnesium, boron, molybdenum, copper, manganese, iron, and zinc; optionally microorganisms and/or microbe-based preparations, and optionally ferments; wherein the ratio of nitrogen to potassium is at least 1.0 : 2.0. Furthermore, the invention relates to a nutrient solution comprising such a nutrient combination and water, and to a method for the soilless cultivation of plants.

[0003] The commercial production of plants and plant material for consumption is associated with many difficulties related to the natural botanical characteristics and the environment in which the plants are grown. To ensure economically viable production, proper processes are required to minimize these difficulties and maximize plant growth and production.

[0004] Commercial farms have evolved to grow crops in organized rows. The rows facilitate planting, feeding, pruning, watering, caring for and harvesting the plants or the food products produced by the plants. Conventional farming methods often use flood irrigation techniques and the mass spraying of chemicals for fumigation and fertilization.

[0005] Flood irrigation and mass spraying are not only a waste of water and chemical resources, but can also damage surface soils and ground and surface water sources. Irrigating fields with flood water promotes erosion and runoff of fertilizers and pesticides into water sources. In dry areas, flood irrigation often leads to mineralization of the soil, which is associated with the accumulation of surface salts. Flood irrigation also leads to strong fluctuations in soil moisture, which is stressful for the plants.

[0006] Hydroponic cultivation has so far been practiced for the cultivation of vegetables, flowers and other annual plants that do not develop a large root system. Hydroponics is a subset of hydroculture in which plants are cultivated in a nutrient-rich water-based solution. In hydroculture, no soil is used, but the root system is supported by an inert medium. The basic principle of hydroponics is that the plant roots come into direct contact with the nutrient solution and at the same time have access to oxygen, which is essential for good growth. In contrast to outdoor cultivation, plants are usually grown hydroponically in a greenhouse or in a closed environment on inert media.

[0007] For healthy and rapid growth, especially in a hydroponic environment, plants require a balanced supply of soluble nutrients. Liquid fertilizers usually contain the most important macronutrients nitrogen, phosphorus and potassium as well as the micronutrients iron, manganese, zinc, copper, boron and

molybdenum, although the trace elements calcium, magnesium and sulphur are often missing. The use of fertilizers of this type can lead to unbalanced growth and nutrient deficiencies in the plants. Insufficient or excessive amounts of a nutrient can lead to poor crop results. Excess amounts can be particularly problematic as they can damage crops, waste money and fertilizer resources, and pollute the environment if fertilizer is released when the nutrient delivery system is flushed.

[0008] The correct timing of nutrient application takes into account the plant's growth pattern and therefore the natural changes in nutrient requirements throughout the season. Plant development goes through different phases. It is important to anticipate changes in growth and nutrient requirements so that fertilization can be timed to meet the needs of growth.

[0009] Various nutrient compositions for the (soilless) cultivation of plants are known from the prior art.

[0010] CN 105 777 269 A relates to a nutrient-rich nutrient solution for soilless cultures as well as production and application methods for the nutrient-rich nutrient solution for soilless cultures. The nutrient-rich soilless nutrient solution comprises main materials, trace elements and water, wherein the main materials comprise potassium nitrate, calcium nitrate, magnesium sulfate, calcium superphosphate, ethylenediaminetetraacetic acid and humic acid; and the trace elements comprise ferric sulfate, magnesium sulfate, boric acid, zinc sulfate, copper sulfate, ammonium molybdate and cobalt chloride.

[0011] CN 105 859 384 A relates to a high-quality nutrient solution for soilless culture as well as to production and application methods for the high-quality nutrient solution for soilless culture. The high-quality nutrient solution for soilless culture contains main materials, microelements and water, wherein the main materials include potassium nitrate, calcium nitrate, magnesium sulfate, calcium superphosphate and sulfuric acid; and the microelements include ferric sulfate, manganese sulfate, borax, zinc sulfate, copper sulfate and ammonium molybdate.

[0012] CN 106 431 610 A relates to a biological organic nutrient solution which is integrated with four effects, i.e. rapid effect, long-term effect, special effect and synergism, and can enable the combination of microorganisms and the organic nutrient solution to exert a better effect. The nutrient solution is prepared from the following substances in parts by weight: 300 to 350 parts water, 100 to 140 parts potassium nitrate, 80 to 100 parts ammonium sulfate, 140 to 180 parts monopotassium phosphate, 25 to 30 parts magnesium sulfate, 20 to 30 parts calcium nitrate, 160 to 180 parts amino acid, 120 to 140 parts fulvic acid, 2 to 3 parts zinc sulphate, 2 to 3 parts manganese sulphate, 3 to 4 parts boric acid, 1 to 2 parts sodium selenite, 3 to 6 parts sodium polyaspartic acid, 5 to 8 parts aminooligosaccharin, 1 to 2 parts *Bacillus subtilis*, 1 to 2 parts PGPR probiotics and 2 to 3 parts EM probiotics.

[0013] CN 108 558 494 A relates to a cultivation technique for organic corn with a microelement and probiotic nutrient mixture and selenium-rich zinc, characterized in that it contains nutrient components, trace element components and probiotic components, wherein the nutrient components consist of urea,

$P_{2}O_5$ and K_2O ; the trace element components consist of selenium, zinc, sulphur, boron, iron, manganese, copper, molybdenum, calcium and magnesium; the probiotic components consist of one or more combinations of amino acids, fulvic acids, humic acid, alginic acid and superoxide dismutase. The high content of organic selenium, zinc, calcium, magnesium and other elements in corn meets the needs of the human body, improves immunity, prevents cancer and increases the resistance of plants to drought and pest infestation.

[0014] US 2009 0229331 A1 relates to a concentrated, homogeneous, stable, water-soluble fertilizer suspension comprising: water-soluble mineral nutrients of at least nitrogen, phosphorus, potassium, calcium and magnesium; and an organic stabilizing additive; and wherein the pourable, aqueous suspension has water-soluble mineral nutrients in an amount of at least about 80 weight percent (wt.-%) of the suspension.

[0015] US 2015 075239 A1 relates to soil conditioner/leaf nutrient compositions and methods of making and using the same. The compositions are aqueous compositions comprising a carbon skeletal energy (CSE) component, a macronutrient, a vitamin cofactor, a complexing agent and at least one exotic micronutrient component and an ionophore component.

[0016] US 2016 221886 A1 relates to a method for hydroponically growing plants, comprising hydroponically growing the plants in the presence of a controlled release hydroponic fertilizer composition. The hydroponic fertilizer composition comprises a polymer-coated controlled release fertilizer formulation, the coated formulation having an N-P-K ratio, wherein the N-K ratio is substantially balanced, and further comprising micronutrients and optionally chelated iron.

[0017] US 2020 154652 A1 discloses nutrient compositions for plant growth. A nutritional composition includes primary macronutrients including nitrogen, phosphorus and potassium, secondary macronutrients including calcium and sulfur. A nutrient composition may contain micronutrients and additional secondary macronutrients, such as magnesium. Nutrient compositions that contain such nutrient sources exhibit beneficial plant growth. Hydroponic nutrient composition, water soluble powder and plant growth media containing the nutrient composition and methods of using the nutrient compositions are also disclosed.

[0018] US 2022 194873 A1 relates to a concentrated composition for plant nutrition. The composition contains a polymeric stabilizing agent having a high number of polar hydrophilic groups, such as microfibrillated cellulose (MFC), comprising calcium ions, sulfate ions and salts of other elements for plant nutrition.

[0019] WO 2016 103162 A2 discloses a method of treating a plant comprising contacting a fertilizer composition with the soil in the vicinity of the plant, the plant comprising one or more of the following plants: a date palm, a citrus plant, a fig plant, a mango plant or an olive plant, wherein the fertilizer

composition comprises nitrogen, phosphorus and potassium (NPK) in various degrees, including in the range of about 10-24:5-12:10-24.

[0020] WO 2018 156266 A1 relates to a fertilizer composition comprising a growth promoting component, in at least one example a copolymer of fulvic acid and polymetallic humates, in an amount of from about 80% to about 90% by weight, based on the total weight of the fertilizer composition; a plurality of elements present in an amount of from about 3% to about 7% by weight, based on the total weight of the fertilizer composition; and one or more secondary nutrients, micronutrients and biologically active heteromolecular trace metal complexes present in an amount of from about 3 to about 10% by weight, based on the total weight of the fertilizer.

[0021] However, the nutrient combinations of the prior art are not satisfactory in every respect. In the soilless cultivation of plants, in particular lettuce, symptoms of nutrient deficiency can be observed when using known nutrient combinations, in particular potassium deficiency, calcium deficiency and magnesium deficiency. There is a need for improved nutrient combinations for the soilless cultivation of plants, which enable optimum plant growth and can be individually adapted to the needs of the plants.

[0022] It is therefore an object of the invention to provide improved nutrient combinations which are suitable for the soilless cultivation of plants, in particular in vertical farming over at least two levels, preferably at least three levels.

[0023] This object has been solved by the subject matter of the patent claims.

[0024] It has been found that the nutrient combination according to the invention is suitable for the soilless cultivation of plants. The amount of nutrients supplied can be specifically adjusted and adapted to the respective needs of the plant, which are, for example, dependent on the type of plant or the growth phase. It has been surprisingly found that a ratio of nitrogen to potassium of at least 1.0 : 2.0 is particularly advantageous for the growth of various plants.

[0025] Furthermore, it has been surprisingly found that the nutrient combination according to the invention enables the cultivation of plants, in particular lettuce, without the plants showing symptoms of nutrient deficiency, such as potassium deficiency, calcium deficiency or magnesium deficiency. It has been found that a relative weight ratio of nitrogen to potassium in the range of 1.0 : 1.5 to 1.0 : 6.0 and a relative weight ratio of nitrogen to phosphorus in the range of 1.0 : 0.2 to 1.0 : 0.8 is particularly advantageous for this purpose. It has also been found that a relative weight ratio of nitrogen to calcium of at least 1.0 : 3.0 is particularly advantageous for this purpose. The nutrient combination according to the invention makes the nutrients available to the plants in sufficient quantities and with better availability.

[0026] In addition, it has been surprisingly found that the nutrient combination according to the invention has improved storage stability.

[0027] Hydroponic cultivation has been found to offer many advantages. Hydroponic crops result in the highest biomass and protein production of plants grown under the same environmental conditions and supplied with the same levels of nutrients compared to other growing media. This is possible through careful control of the nutrient solution and pH value. A hydroponic system uses less water than plants in soil because the system is closed and therefore there is less evaporation. Hydroponics is better for the environment because it produces less waste and pollution from soil runoff. Hydroponics provides healthier plants than traditional soil cultivation because the supply of nutrients to the plants can be more easily regulated to optimize plant growth.

[0028] A first aspect of the invention relates to a nutrient combination for soilless cultivation of plants, in particular in vertical farming over at least two levels, preferably at least three levels, comprising at least:

- nitrogen, in an amount in the range from 0.001 to 15% by weight;
- phosphorus, in an amount in the range from 0.01 to 6.0% by weight;
- potassium, in an amount ranging from 1.0 to 30 % by weight;
- sulphur, in an amount ranging from 0.1 to 10% by weight;
- calcium, in an amount ranging from 0.4 to 30% by weight, preferably 0.4 to 10% by weight;
- magnesium, in an amount ranging from 0.04 to 5.0% by weight;
- boron, in an amount ranging from 0.001 to 0.05% by weight;
- molybdenum, in an amount ranging from 0.0005 to 0.05% by weight;
- copper, in an amount ranging from 0.0005 to 0.05% by weight;
- manganese, in an amount ranging from 0.001 to 0.1% by weight;
- iron, in an amount ranging from 0.001 to 1.0% by weight; and
- zinc, in an amount ranging from 0.001 to 0.4% by weight;

in each case based on the total weight of the nutrient combination;

optionally microorganisms and/or microbe-based preparations, preferably consisting of chitin or toxins, selected from the group consisting of *Arthrobacter globiformis*, *Azospilillum brasilense*, *Azospilillum lipoferum*, *Azotobacter chroococcum*, *Azotobacter paspali*, *Azotobacter vinelandii*, *Bacillus amyloliquefaciens*, *Bacillus atrophaeus*, *Bacillus licheniformis*, *Bacillus megaterium*, *Bacillus pumilus*, *Bacillus subtilis*, *Bacillus thuringiensis*, *Bifidobacterium animalis*, *Bifidobacterium lactis*, *Bifidobacterium longum*, *Brevibacillus brevis*, *Cellulomonas fimi*, *Lactobacillus acidophilus*, *Lactobacillus casei*, *Lactobacillus lactis*, *Lactobacillus plantarum*, *Lactobacillus rhamnosus*, *Lactococcus lactis*, *Leuconostoc pseudomesenteroides*, *Micrococcus luteus*, *Phanerochaete chrysosporium*, *Pseudomonas aeruginosa*, *Pseudomonas argentinensis*, *Pseudomonas azotoformans*, *Pseudomonas chlororaphis*,

Pseudomonas fluorescens, *Pseudomonas fulva*, *Pseudomonas nitroreducens*, *Pseudomonas poae*, *Pseudomonas putida*, *Pseudomonas stutzeri*, *Rhodopseudomonas palustris*, *Rhodospirillum rubrum*, *Saccharomyces cerevisiae*, *Streptococcus thermophilus*, *Streptomyces griseus*, and *Trichoderma reesei*; and

optionally, ferments selected from algae, compost, molasses and mung beans;

wherein the ratio of nitrogen to potassium is at least 1.0 : 2.0; preferably the ratio of nitrogen to potassium is in the range of 1.0 : 2.0 to 1.0 : 15.

[0029] For the purposes of the description, a ratio of nitrogen to potassium of at least 1.0 : 2.0 means that the nutrient combination according to the invention comprises nitrogen and potassium in a ratio of 1.0 to 2.0, or that the nutrient combination according to the invention comprises potassium in a relative proportion of more than 2.0.

[0030] The nutrient combination according to the invention is preferably a concentrate or a powder with a relatively high concentration of nutrients, preferably with a concentration of nutrients of at least 130,000 ppm, preferably at least 190,000 ppm, more preferably at least 250,000 ppm, even more preferably at least 550,000 ppm. For use in the cultivation of plants, in particular for watering the plants, the nutrient combination is preferably diluted with water to form a nutrient solution.

[0031] Preferably, the nutrient combination according to the invention has a total nutrient concentration in the range from 100 000 to 200 000 ppm, more preferably from 110 000 to 190 000 ppm, even more preferably from 120 000 to 180 000 ppm, and most preferably from 120 000 to 140 000 ppm.

[0032] The nutrient combination according to the invention comprises the macronutrients nitrogen, phosphorus and potassium as well as the micronutrients iron, manganese, zinc, copper, boron and molybdenum, and also the trace elements calcium, magnesium and sulphur. The nutrient combination therefore contains all the nutrients required to cultivate plants in a mixed culture. Other nutrients may also be included in the nutrient combination.

[0033] For the purposes of description, "*soilless cultivation*" is a cultivation method in which plants are cultivated independently of the native soil. The plant is mechanically stabilized and the plants require additional substrate for a stable hold.

[0034] For the purposes of the description, "*vertical farming*" is a special form of urban farming in which plants are cultivated on several superimposed levels based on recirculation and hydroponics under greenhouse conditions.

[0035] Unless expressly stated otherwise, all percentages are by weight. Unless expressly stated otherwise, all percentages refer to the total weight of the nutrient combination or nutrient solution according to the invention. Unless expressly stated otherwise, all indications in g per liter refer to one liter of the

nutrient combination according to the invention or the nutrient solution according to the invention. Unless expressly stated otherwise, all values in ppm are by weight, i.e. ppmw.

[0036] Preferably, the nutrient combination according to the invention has a density at 23°C in the range from 1.00 to 1.60 g/cm³, preferably from 1.02 to 1.50 g/cm³, more preferably from 1.04 to 1.40 g/cm³, even more preferably from 1.06 to 1.30 g/cm³, most preferably from 1.08 to 1.25 g/cm³, and particularly preferably from 1.09 to 1.23 g/cm³.

[0037] In preferred embodiments, the nutrient combination according to the invention has a density of 1.23 g/cm³.

[0038] In other preferred embodiments, the nutrient combination according to the invention has a density of 1.096 g/cm³.

[0039] Preferably, the nutrient combination comprises microorganisms and/or microbe-based preparations.

[0040] Preferably, an interaction of the plants with the microorganisms and/or microbe-based preparations can be induced in a targeted manner, thereby positively influencing the nutrition of the plant and the plant's own stress management. Preferably, such microorganisms and/or microbe-based preparations can promote the growth of plant biomass and the development of leaves and roots and at the same time strengthen the plant's defense against biotic and abiotic stress. Preferably, lower quantities of (synthetic) plant protection agents, stress regulators or growth-promoting agents can be used as a result.

[0041] Preferably, the nutrient combination comprises a solution containing microorganisms and/or microbe-based preparations. Suitable solutions containing microorganisms and/or microbe-based preparations are commercially available, for example under the name *Rhizoferm* from Microbe Factory. A preferred composition of this solution is summarized in the table below:

Nutrient	Concentration [g/L]
Nitrogen	7.6
Phosphorus	1.0
Potassium	1.2
Sulphur	2.7
Magnesium	0.9
Calcium	0.48
Iron	0.195
Manganese	0.010
Boron	0.001
Zinc	0.013

[0042] Preferred microorganisms and their function are summarized in the table below:

Microorganism	Function and properties
<i>Arthrobacter globiformis</i>	growth stimulating
<i>Azospirillum brasilense</i>	Nitrogen-fixing bacteria

<i>Azospirillum lipoferum</i>	Nitrogen-fixing bacteria
<i>Azotobacter chroococcum</i>	Nitrogen-fixing bacteria
<i>Azotobacter paspali</i>	Nitrogen-fixing bacteria
<i>Azotobacter vinelandii</i>	Nitrogen-fixing bacteria
<i>Bacillus amyloliquefaciens</i>	Nitrogen-fixing bacteria
<i>Bacillus atrophaeus</i>	Nitrogen-fixing bacteria
<i>Bacillus licheniformis</i>	Nitrogen-fixing bacteria
<i>Bacillus megaterium</i>	Nitrogen-fixing bacteria
<i>Bacillus pumilus</i>	Nitrogen-fixing bacteria
<i>Bacillus subtilis</i>	Nitrogen-fixing bacteria
<i>Bifidobacterium animalis</i>	Actinobacteria
<i>Bifidobacterium lactis</i>	Actinobacteria
<i>Bifidobacterium longum</i>	Actinobacteria
<i>Brevibacillus brevis</i>	growth stimulating
<i>Cellulomonas fimi</i>	Actinobacteria
<i>Kushneria marisflavi</i>	growth stimulating, reduces salt stress
<i>Lactobacillus acidophilus</i>	Lactic acid bacteria
<i>Lactobacillus casei</i>	Lactic acid bacteria
<i>Lactobacillus lactis</i>	Lactic acid bacteria
<i>Lactobacillus plantarum</i>	Lactic acid bacteria
<i>Lactobacillus rhamnosus</i>	Lactic acid bacteria
<i>Lactococcus lactis</i>	Lactic acid bacteria
<i>Leuconostoc pseudomesenteroides</i>	Lactic acid bacteria; fermentation
<i>Micrococcus luteus</i>	growth-stimulating
<i>Phanerochaete chrysosporium</i>	growth-stimulating
<i>Pseudomonas aeruginosa</i>	potentially growth-stimulating (produces HCN)
<i>Pseudomonas argentinensis</i>	growth-stimulating, reduces salt stress
<i>Pseudomonas azotoformans</i>	growth-stimulating, reduces salt stress
<i>Pseudomonas chlororaphis</i>	Biocontrol agent (fungicide)
<i>Pseudomonas fluorescens</i>	growth-stimulating; biocontrol agent
<i>Pseudomonas fulva</i>	potential biocontrol agent (fungicide)
<i>Pseudomonas nitroreducens</i>	growth stimulant; nitrate absorption
<i>Pseudomonas poae</i>	Biocontrol agent (fungicide)
<i>Pseudomonas putida</i>	growth-stimulating (fixes nitrogen)
<i>Pseudomonas stutzeri</i>	growth stimulating, reduces salt stress
<i>Rhodospirillum rubrum</i>	Nitrogen- and CO ₂ -fixing photosynthetic bacteria
<i>Rhodospirillum rubrum</i>	Nitrogen- and CO ₂ -fixing photosynthetic bacteria
<i>Saccharomyces cerevisiae</i>	growth-stimulating, biocontrol agent
<i>Streptococcus thermophilus</i>	Lactic acid bacteria; fermentation
<i>Streptomyces griseus</i>	growth-stimulating
<i>Trichoderma reesei</i>	growth stimulating

[0043] Preferably, the nutrient combination comprises at least a total proportion of microorganisms of 50 ppm; more preferably at least 80 ppm, even more preferably at least 120 ppm, most preferably at least 150 ppm.

[0044] The content of nitrogen, phosphorus and potassium (NPK) can be specified in various forms. For the purpose of description, the NPK content refers to the percentage by weight of the nutrient combination. For example, an NPK value of 10 : 5 : 10 means that 100 g of this nutrient combination contains 10 g of nitrogen, 5 g of phosphorus and about 10 g of potassium.

[0045] Preferably, the ratio of nitrogen to phosphorus to potassium (N : P : K) is in the range from 1.0 : 0.1 : 1.5 to 1.0 : 1.0 : 8.0, more preferably from 1.0 : 0.2 : 2.5 to 1.0 : 0.7 : 6.0, more preferably from 1.0 : 0.3 : 3.5 to 1.0 : 0.5 : 4.5.

[0046] In preferred embodiments, the concentration of potassium is greater than the concentration of nitrogen.

[0047] In preferred embodiments, the concentration of potassium is greater than the concentration of phosphorus.

[0048] In preferred embodiments, the concentration of nitrogen is greater than the concentration of phosphorus.

[0049] In preferred embodiments, the concentration of calcium is greater than the concentration of nitrogen.

[0050] Preferably, the ratio of nitrogen to potassium (N : K) is at least 1.0 : 2.4, more preferably at least 1.0 : 2.7, more preferably at least 1.0 : 3.0, even more preferably at least 1.0 : 3.3, most preferably at least 1.0 : 3.6, and in particular at least 1.0 : 3.9.

[0051] Preferably, the ratio of nitrogen to potassium (N : K) is at most 1.0 : 10, preferably at most 1.0 : 8.0, more preferably at most 1.0 : 7.0, even more preferably at most 1.0 : 6.0, most preferably at most 1.0 : 5.5, and in particular at most 1.0 : 5.0.

[0052] Preferably, the ratio of nitrogen to potassium (N : K) is in the range from 1.0 : 1.0 to 1.0 : 6.5, more preferably from 1.0 : 1.5 to 1.0 : 6.0, more preferably from 1.0 : 2.0 to 1.0 : 5.5, even more preferably from 1.0 : 2.5 to 1.0 : 5.0, most preferably from 1.0 : 3.0 to 1.0 : 4.6, and in particular from 1.0 : 3.0 to 1.0 : 4.2.

[0053] Preferably, the ratio of nitrogen to phosphorus (N : P) is at least 1.0 : 0.15, preferably at least 1.0 : 0.20, more preferably at least 1.0 : 0.25, even more preferably at least 1.0 : 0.30, most preferably at least 1.0 : 0.35, and in particular at least 1.0 : 0.40.

[0054] Preferably, the ratio of nitrogen to phosphorus (N : P) is at most 1.0 : 1.0, preferably at most 1.0 : 0.9, more preferably at most 1.0 : 0.8, even more preferably at most 1.0 : 0.7, most preferably at most 1.0 : 0.6, and in particular at most 1.0 : 0.5.

[0055] Preferably, the ratio of nitrogen to phosphorus (N : P) is in the range from 1.0 : 0.15 to 1.0 : 0.9, more preferably from 1.0 : 0.2 to 1.0 : 0.8, more preferably from 1.0 : 0.25 to 1.0 : 0.7, even more preferably from 1.0 : 0.3 to 1.0 : 0.6, most preferably from 1.0 : 0.35 to 1.0 : 0.5, and in particular from 1.0 : 0.35 to 1.0 : 0.45.

[0056] Preferably, the ratio of nitrogen to calcium (N : Ca) is at least 1.0 : 2.4, preferably at least 1.0 : 2.7, more preferably at least 1.0 : 3.0, even more preferably at least 1.0 : 3.3, most preferably at least 1.0 : 3.6, and in particular at least 1.0 : 3.9.

[0057] Preferably, the ratio of nitrogen to calcium (N : Ca) is at most 1.0 : 10, preferably at most 1.0 : 8.0, more preferably at most 1.0 : 7.0, even more preferably at most 1.0 : 6.0, most preferably at most 1.0 : 5.5, and in particular at most 1.0 : 5.0.

[0058] Preferably, the ratio of nitrogen to calcium (N : Ca) is in the range from 1.0 : 0.4 to 1.0 : 8.0, preferably from 1.0 : 1.0 to 1.0 : 6.5, more preferably from 1.0 : 1.5 to 1.0 : 6.0, even more preferably from 1.0 : 2.0 to 1.0 : 5.5, most preferably from 1.0 : 2.5 to 1.0 : 5.0, and in particular from 1.0 : 2.5 to 1.0 : 3.5.

[0059] In preferred embodiments

- the ratio of nitrogen to potassium (N : K) is in the range from 1.0 : 2.5 to 1.0 : 5.0;
- the ratio of nitrogen to phosphorus (N : P) is in the range from 1.0 : 0.3 to 1.0 : 0.6; and
- the ratio of nitrogen to calcium (N : Ca) is in the range from 1.0 : 1.5 to 1.0 : 6.0.

[0060] Preferably, the ratio of nitrogen to magnesium (N : Mg) is in the range from 1.0 : 0.3 to 1.0 : 1.2, more preferably from 1.0 : 0.4 to 1.0 : 1.1, more preferably from 1.0 : 0.5 to 1.0 : 1.0, even more preferably from 1.0 : 0.6 to 1.0 : 0.9, and most preferably from 1.0 : 0.7 to 1.0 : 0.8.

[0061] In preferred embodiments, the nutrient combination according to the invention comprises sodium.

[0062] In preferred embodiments, the nutrient combination according to the invention comprises chlorine.

[0063] Preferably, the nutrient combination according to the invention comprises a nitrogen source selected from the group consisting of calcium nitrate, sodium nitrate, potassium nitrate, ammonium nitrate, monoammonium phosphate, diammonium phosphate, triammonium phosphate, ammonium sulfate, ammonium thiosulfate, ammonium chloride, ammonia, calcium cyanamide, calcium ammonium nitrate, urea, ammonium lignosulfonate, ammonium bifluoride, and ammonium heptamolybdate; preferably calcium nitrate.

[0064] Preferably, the nutrient combination according to the invention comprises a phosphorus source selected from the group consisting of phosphorus pentoxide, phosphoric acid, monoammonium phosphate, diammonium phosphate, triammonium phosphate, potassium pyrophosphate, sodium pyrophosphate, potassium phosphate, and sodium phosphate; preferably phosphorus pentoxide.

[0065] Preferably, the nutrient combination according to the invention comprises a potassium source selected from the group consisting of potassium oxide, potassium chloride, potassium sulfate, potassium

carbonate, potassium acetate, potassium citrate, potassium hydroxide, potassium manganate, potassium phosphate, potassium molybdate, potassium thiosulfate, and potassium nitrate; preferably potassium oxide.

[0066] Preferably, the nutrient combination according to the invention comprises a sulfur source selected from the group consisting of ammonium sulfate, calcium sulfate, potassium sulfate, magnesium sulfate, sulfuric acid, cobalt sulfate, copper sulfate, iron sulfate, sulfur trioxide, and sulfur; preferably sulfur trioxide.

[0067] Preferably, the nutrient combination according to the invention comprises a calcium source selected from the group consisting of calcium nitrate, calcium cyanamide, calcium acetate, calcium borate, calcium carbonate, calcium chloride, calcium citrate, calcium lactate, calcium oxide, calcium sulfate, calcium tartrate, calcium ammonium nitrate, and calcium lignosulfonate; preferably calcium oxide or calcium carbonate.

[0068] In particularly preferred embodiments, the nutrient combination according to the invention comprises calcium ammonium nitrate. Calcium ammonium nitrate (KAS) is a mixture of ammonium nitrate and calcium carbonate, preferably 76% by weight of ammonium nitrate and 24% by weight of calcium carbonate, based on the total weight of the calcium ammonium nitrate.

[0069] Preferably, the nutrient combination according to the invention comprises a magnesium source selected from the group consisting of magnesium oxide, magnesium acetate, magnesium borate, magnesium chloride, magnesium citrate, magnesium nitrate, magnesium phosphate, and magnesium sulfate; preferably magnesium oxide.

[0070] Preferably, the nutrient combination according to the invention comprises a boron source selected from the group consisting of boric acid, calcium borate, potassium borohydride, borax, boron trioxide, potassium tetraborate, sodium borate, sodium borohydride, and sodium tetraborate.

[0071] Preferably, the nutrient combination according to the invention comprises a source of molybdenum selected from the group consisting of molybdic acid, calcium molybdate, potassium molybdate, sodium molybdate, and ammonium molybdate.

[0072] Preferably, the nutrient combination according to the invention comprises a copper source selected from the group consisting of copper acetate, copper chlorate, copper chloride, copper citrate, copper nitrate, and copper sulfate.

[0073] Preferably, the nutrient combination according to the invention comprises a manganese source selected from the group consisting of manganese acetate, manganese chloride, manganese nitrate, manganese phosphate, and manganese sulfate.

[0074] Preferably, the nutrient combination according to the invention comprises an iron source selected from the group consisting of iron chloride, iron citrate, iron nitrate, iron oxide, iron citrate, iron sulfate, and iron sulfonate.

[0075] Preferably, the nutrient combination according to the invention comprises a zinc source selected from the group consisting of zinc oxide, zinc acetate, zinc chloride, zinc citrate, zinc nitrate, and zinc sulphate.

[0076] Preferably, the nutrient combination according to the invention comprises nitrogen in an amount of at least 0.2% by weight of the nutrient combination, more preferably at least 0.4% by weight, more preferably at least 0.6% by weight, even more preferably at least 0.8% by weight, most preferably at least 1.0% by weight, and in particular at least 1.2% by weight, in each case based on the total weight of the nutrient combination.

[0077] Preferably, the nutrient combination according to the invention comprises nitrogen in an amount of at most 3.5% by weight of the nutrient combination, preferably at most 3.0% by weight, more preferably at most 2.5% by weight, even more preferably at most 2.0% by weight, most preferably at most 1.6% by weight, and in particular at most 1.2% by weight, in each case based on the total weight of the nutrient combination.

[0078] Preferably, the nutrient combination according to the invention comprises nitrogen in an amount in the range of from 0.005 to 8.0% by weight of the nutrient combination, preferably in the range of from 0.01 to 6.0% by weight, more preferably in the range of from 0.015 to 4.0% by weight, still more preferably in the range of from 0.015 to 4.0% by weight, even more preferably in the range of from 0.2 to 2.0 % by weight, most preferably in the range from 0.6 to 1.5 % by weight, and in particular in the range from 1.0 to 1.25 % by weight, in each case based on the total weight of the nutrient combination.

[0079] Preferably, the nutrient combination according to the invention comprises phosphorus in an amount of at least 0.4% by weight of the nutrient combination, preferably at least 0.5% by weight, more preferably at least 0.6% by weight, even more preferably at least 0.7% by weight, most preferably at least 0.8% by weight, and in particular at least 0.9% by weight, in each case based on the total weight of the nutrient combination.

[0080] Preferably, the nutrient combination according to the invention comprises phosphorus in an amount of at most 3.0% by weight of the nutrient combination, preferably at most 2.5% by weight, more preferably at most 2.0% by weight, even more preferably at most 1.5% by weight, most preferably at most 1.0% by weight, and in particular at most 0.8% by weight, in each case based on the total weight of the nutrient combination.

[0081] Preferably, the nutrient combination according to the invention comprises phosphorus in an amount in the range of from 0.05 to 5.0% by weight of the nutrient combination, preferably in the range

of from 0.1 to 2.5% by weight, more preferably in the range of from 0.2 to 1.8% by weight, even more preferably in the range of from 0.2 to 1.8% by weight, even more preferably in the range from 0.3 to 1.4 % by weight, most preferably in the range from 0.4 to 1.2 % by weight, and in particular in the range from 0.5 to 1.0 % by weight, in each case based on the total weight of the nutrient combination.

[0082] Preferably, the nutrient combination according to the invention comprises potassium in an amount of at least 2.5% by weight of the nutrient combination, preferably at least 3.0% by weight, more preferably at least 3.5% by weight, even more preferably at least 4.0% by weight, most preferably at least 4.5% by weight, and in particular at least 5.0% by weight, in each case based on the total weight of the nutrient combination.

[0083] Preferably, the nutrient combination according to the invention comprises potassium in an amount of at least 10% by weight of the nutrient combination, more preferably at least 12% by weight, more preferably at least 14% by weight, even more preferably at least 16% by weight, most preferably at least 18% by weight, and in particular at least 20% by weight, in each case based on the total weight of the nutrient combination.

[0084] Preferably, the nutrient combination according to the invention comprises potassium in an amount of at most 8.5% by weight of the nutrient combination, preferably at most 8.0% by weight, more preferably at most 7.5% by weight, even more preferably at most 7.0% by weight, most preferably at most 6.5% by weight, and in particular at most 6.0% by weight, in each case based on the total weight of the nutrient combination.

[0085] Preferably, the nutrient combination according to the invention comprises potassium in an amount in the range from 2.0 to 8.5 % by weight of the nutrient combination, preferably in the range from 2.5 to 8.0 % by weight, more preferably in the range from 3.0 to 7.5% by weight, even more preferably in the range from 3.5 to 7.0 % by weight, most preferably in the range from 4.0 to 6.5 % by weight, and in particular in the range from 4.5 to 6.0 % by weight, in each case based on the total weight of the nutrient combination.

[0086] Preferably, the nutrient combination according to the invention comprises sulphur in an amount in the range from 0.2 to 5.0% by weight of the nutrient combination, more preferably in the range from 0.4 to 3.0% by weight, more preferably in the range from 0.6 to 2.5% by weight, still more preferably in the range from 0.5 to 2.5% by weight, still more preferably in the range from 0.5 to 3.0% by weight of the nutrient combination.% by weight, even more preferably in the range from 0.8 to 2.0 % by weight, most preferably in the range from 1.0 to 1.5 % by weight, and in particular in the range from 1.2 to 1.3 % by weight, in each case based on the total weight of the nutrient combination.

[0087] Preferably, the nutrient combination according to the invention comprises calcium in an amount of at least 3.0% by weight of the nutrient combination, more preferably at least 3.5% by weight, more

preferably at least 4.0% by weight, even more preferably at least 4.5% by weight, most preferably at least 5.0% by weight, and in particular at least 5.5% by weight, in each case based on the total weight of the nutrient combination.

[0088] Preferably, the nutrient combination according to the invention comprises calcium in an amount of at least 8.0% by weight of the nutrient combination, more preferably at least 10% by weight, more preferably at least 12% by weight, still more preferably at least 14% by weight, most preferably at least 16% by weight, and in particular at least 18% by weight, in each case based on the total weight of the nutrient combination.

[0089] Preferably, the nutrient combination according to the invention comprises calcium in an amount of at most 27% by weight of the nutrient combination, more preferably at most 24% by weight, more preferably at most 21% by weight, still more preferably at most 18% by weight, most preferably at most 15% by weight, and in particular at most 12% by weight, in each case based on the total weight of the nutrient combination.

[0090] Preferably, the nutrient combination according to the invention comprises calcium in an amount of at most 8.5% by weight of the nutrient combination, more preferably at most 8.0% by weight, more preferably at most 7.5% by weight, even more preferably at most 7.0% by weight, most preferably at most 6.5% by weight, and in particular at most 6.0% by weight, in each case based on the total weight of the nutrient combination.

[0091] Preferably, the nutrient combination according to the invention comprises calcium in an amount in the range from 0.5 to 9.5 % by weight of the nutrient combination, preferably in the range from 1.0 to 9.0 % by weight, more preferably in the range from 2.0 to 8.5% by weight, even more preferably in the range from 3.0 to 8.0 % by weight, most preferably in the range from 4.0 to 7.5 % by weight, and in particular in the range from 5.0 to 7.0 % by weight, in each case based on the total weight of the nutrient combination.

[0092] Preferably, the nutrient combination according to the invention comprises magnesium in an amount in the range from 0.05 bis 4.0 % by weight of the nutrient combination, preferably in the range from 0.1 bis 3.0 % by weight, more preferably in the range from 0.2 bis 2.5 % by weight, even more preferably in the range from 0.4 to 2.0 % by weight, most preferably in the range from 0.6 to 1.5 % by weight, and in particular in the range from 0.8 to 1.0 % by weight, in each case based on the total weight of the nutrient combination.

[0093] Preferably, the nutrient combination according to the invention comprises at most 50% by weight of a growth-promoting component comprising a copolymer of fulvic acid and polymetallic humates (CPFAPH), based on the total weight of the nutrient combination; preferably at most 30% by weight, and more preferably at most 10% by weight, based on the total weight of the nutrient combination.% by weight, and more preferably at most 10 % by weight; even more preferably the nutrient

combination comprises no growth-promoting component comprising a copolymer of fulvic acid and polymetallic humates (CPFAPH).

[0094] In preferred embodiments, the nutrient combination according to the invention is solid, preferably a powder.

[0095] In other preferred embodiments, the nutrient combination according to the invention is liquid.

[0096] Preferably, the nutrient combination according to the invention comprises nitrogen in an amount of at least 0.2 g per liter of the nutrient combination, more preferably at least 0.4 g per liter, more preferably at least 0.6 g per liter, even more preferably at least 0.8 g per liter, most preferably at least 1.0 g per liter, and in particular at least 1.2 g per liter.

[0097] Preferably, the nutrient combination according to the invention comprises nitrogen in an amount of at most 3.5 g per liter of the nutrient combination, preferably at most 3.0 g per liter, more preferably at most 2.5 g per liter, even more preferably at most 2.0 g per liter, most preferably at most 1.6 g per liter, and in particular at most 1.2 g per liter.

[0098] Preferably, the nutrient combination according to the invention comprises nitrogen in an amount in the range from 0.005 to 8.0 g per liter of the nutrient combination, preferably in the range from 0.01 to 6.0 g per liter, more preferably in the range from 0.015 to 4.0 g per liter, even more preferably in the range from 0.2 to 2.0 g per liter, most preferably in the range from 0.6 to 1.5 g per liter, and in particular in the range from 1.0 to 1.25 g per liter.

[0099] Preferably, the nutrient combination according to the invention comprises phosphorus in an amount of at least 0.4 g per liter of the nutrient combination, preferably at least 0.5 g per liter, more preferably at least 0.6 g per liter, even more preferably at least 0.7 g per liter, most preferably at least 0.8 g per liter, and in particular at least 0.9 g per liter.

[0100] Preferably, the nutrient combination according to the invention comprises phosphorus in an amount of at most 3.0 g per liter of the nutrient combination, preferably at most 2.5 g per liter, more preferably at most 2.0 g per liter, even more preferably at most 1.5 g per liter, most preferably at most 1.0 g per liter, and in particular at most 0.8 g per liter.

[0101] Preferably, the nutrient combination according to the invention comprises phosphorus in an amount in the range from 0.05 to 5.0 g per liter of the nutrient combination, preferably in the range from 0.1 to 2.5 g per liter, more preferably in the range from 0.2 to 1.8 g per liter, even more preferably in the range from 0.3 to 1.4 g per liter, most preferably in the range from 0.4 to 1.2 g per liter, and in particular in the range from 0.5 to 1.0 g per liter.

[0102] Preferably, the nutrient combination according to the invention comprises potassium in an amount of at least 2.5 g per liter of the nutrient combination, preferably at least 3.0 g per liter, more

preferably at least 3.5 g per liter, even more preferably at least 4.0 g per liter, most preferably at least 4.5 g per liter, and in particular at least 5.0 g per liter.

[0103] Preferably, the nutrient combination according to the invention comprises potassium in an amount of at most 8.5 g per liter of the nutrient combination, preferably at most 8.0 g per liter, more preferably at most 7.5 g per liter, even more preferably at most 7.0 g per liter, most preferably at most 6.5 g per liter, and in particular at most 6.0 g per liter.

[0104] Preferably, the nutrient combination according to the invention comprises potassium in an amount in the range from 2.0 to 8.5 g per liter of the nutrient combination, preferably in the range from 2.5 to 8.0 g per liter, more preferably in the range from 3.0 to 7.5 g per liter, even more preferably in the range from 3.5 to 7.0 g per liter, most preferably in the range from 4.0 to 6.5 g per liter, and in particular in the range from 4.5 to 6.0 g per liter.

[0105] Preferably, the nutrient combination according to the invention comprises sulfur in an amount in the range from 0.2 to 5.0 g per liter of the nutrient combination, preferably in the range from 0.4 to 3.0 g per liter, more preferably in the range from 0.6 to 2.5 g per liter, even more preferably in the range from 0.8 to 2.0 g per liter, most preferably in the range from 1.0 to 1.5 g per liter, and in particular in the range from 1.2 to 1.3 g per liter.

[0106] Preferably, the nutrient combination according to the invention comprises calcium in an amount in the range from 0.5 to 9.5 g per liter of the nutrient combination, preferably in the range from 1.0 to 9.0 g per liter, more preferably in the range from 2.0 to 8.5 g per liter, even more preferably in the range from 3.0 to 8.0 g per liter, most preferably in the range from 4.0 to 7.5 g per liter, and in particular in the range from 5.0 to 7.0 g per liter.

[0107] Preferably, the nutrient combination according to the invention comprises magnesium in an amount in the range from 0.05 to 4.0 g per liter of the nutrient combination, preferably in the range from 0.1 to 3.0 g per liter, more preferably in the range from 0.2 to 2.5 g per liter, even more preferably in the range from 0.4 to 2.0 g per liter, most preferably in the range from 0.6 to 1.5 g per liter, and in particular in the range from 0.8 to 1.0 g per liter.

[0108] Preferably, the nutrient combination according to the invention comprises boron in an amount in the range from 0.002 to 0.035 g per liter of the nutrient combination, preferably in the range from 0.003 to 0.03 g per liter, more preferably in the range from 0.004 to 0.025 g per liter, even more preferably in the range from 0.005 to 0.02 g per liter, most preferably in the range from 0.006 to 0.015 g per liter, and in particular in the range from 0.007 to 0.009 g per liter.

[0109] Preferably, the nutrient combination according to the invention comprises molybdenum in an amount in the range from 0.001 to 0.002 g per liter of the nutrient combination.

[0110] Preferably, the nutrient combination according to the invention comprises copper in an amount in the range from 0.001 to 0.002 g per liter of the nutrient combination.

[0111] Preferably, the nutrient combination according to the invention comprises manganese in an amount in the range from 0.002 to 0.05 g per liter of the nutrient combination, preferably in the range from 0.003 to 0.04 g per liter, more preferably in the range from 0.004 to 0.03 g per liter, even more preferably in the range from 0.005 to 0.025 g per liter, most preferably in the range from 0.006 to 0.02 g per liter, and in particular in the range from 0.007 to 0.016 g per liter.

[0112] Preferably, the nutrient combination according to the invention comprises iron in an amount in the range from 0.002 to 0.5 g per liter of the nutrient combination, preferably in the range from 0.005 to 0.3 g per liter, more preferably in the range from 0.01 to 0.2 g per liter, even more preferably in the range from 0.02 to 0.15 g per liter, most preferably in the range from 0.03 to 0.12 g per liter, and in particular in the range from 0.04 to 0.09 g per liter.

[0113] Preferably, the nutrient combination according to the invention comprises zinc in an amount in the range from 0.002 to 0.2 g per liter of the nutrient combination, preferably in the range from 0.005 to 0.16 g per liter, more preferably in the range from 0.01 to 0.12 g per liter, even more preferably in the range from 0.007 to 0.08 g per liter, most preferably in the range from 0.008 to 0.04 g per liter, and in particular in the range from 0.009 to 0.02 g per liter.

[0114] In preferred embodiments, the nutrient combination according to the invention comprises

- nitrogen, in an amount in the range from 0.001 to 10 g;
- phosphorus, in an amount ranging from 0.01 to 6.0 g;
- potassium, in an amount ranging from 1.0 to 10 g;
- sulphur, in an amount ranging from 0.1 to 6.0 g;
- calcium, in an amount ranging from 0.4 to 10 g;
- magnesium, in an amount ranging from 0.04 to 5.0 g;
- boron, in an amount ranging from 0.001 to 0.05 g;
- molybdenum, in an amount ranging from 0.0005 to 0.05 g;
- copper, in an amount ranging from 0.0005 to 0.05 g;
- manganese, in an amount ranging from 0.001 to 0.1 g;
- iron, in an amount ranging from 0.001 to 1.0 g; and
- zinc, in an amount ranging from 0.001 to 0.4 g;

in each case per liter of the nutrient combination.

[0115] In preferred embodiments, the nutrient combination according to the invention comprises a first nutrient concentrate A and a second nutrient concentrate B.

[0116] In preferred embodiments, the first nutrient concentrate A has a density of 1.23 g/cm³.

[0117] In other preferred embodiments, the second nutrient concentrate B has a density of 1.096 g/cm³.

[0118] Preferably, the nutrient concentrate A comprises nitrogen, calcium, magnesium, copper, manganese, iron and/or zinc.

[0119] Preferably, the nutrient concentrate B comprises nitrogen, phosphorus, potassium, sulphur, boron and/or molybdenum.

[0120] In other preferred embodiments, the nutrient concentrate A comprises nitrogen and calcium. In these preferred embodiments, the nutrient concentrate B comprises nitrogen, magnesium, copper, manganese, iron, zinc, phosphorus, potassium, sulphur, boron and/or molybdenum.

[0121] In other preferred embodiments, the nutrient concentrate B comprises nitrogen and calcium. In these preferred embodiments, the nutrient concentrate A comprises nitrogen, magnesium, copper, manganese, iron, zinc, phosphorus, potassium, sulphur, boron and/or molybdenum.

[0122] Preferably, the first nutrient concentrate A and the second nutrient concentrate B are present in a quantitative ratio of 1:2 to 2:1.

[0123] Preferably, the first nutrient concentrate A comprises nitrogen in an amount of at least 0.1 g per liter of the first nutrient concentrate A, preferably at least 0.2 g per liter, more preferably at least 0.4 g per liter, even more preferably at least 0.6 g per liter, most preferably at least 0.8 g per liter, and in particular at least 1.0 g per liter.

[0124] Preferably, the first nutrient concentrate A comprises nitrogen in an amount of at most 3.5 g per liter of the first nutrient concentrate A, preferably at most 3.0 g per liter, more preferably at most 2.5 g per liter, even more preferably at most 2.0 g per liter, most preferably at most 1.6 g per liter, and in particular at most 1.2 g per liter.

[0125] Preferably, the first nutrient concentrate A comprises nitrogen in an amount in the range from 0.05 to 8.0 g per liter of the first nutrient concentrate A, preferably in the range from 0.1 to 6.0 g per liter, more preferably in the range from 0.15 to 4.0 g per liter, even more preferably in the range from 0.2 to 2.0 g per liter, most preferably in the range from 0.6 to 1.5 g per liter, and in particular in the range from 1.0 to 1.25 g per liter.

[0126] Preferably, the first nutrient concentrate B comprises nitrogen in an amount of at least 0.1 g per liter of the first nutrient concentrate B, preferably at least 0.2 g per liter, more preferably at least 0.4 g per liter, even more preferably at least 0.6 g per liter, most preferably at least 0.7 g per liter, and in particular at least 0.08 g per liter.

[0127] Preferably, the first nutrient concentrate B comprises nitrogen in an amount of at most 0.5 g per liter of the first nutrient concentrate B, preferably at most 0.3 g per liter, more preferably at most 0.25 g per liter, even more preferably at most 0.2 g per liter, most preferably at most 0.15 g per liter, and in particular at most 0.09 g per liter.

[0128] Preferably, the first nutrient concentrate B comprises nitrogen in an amount in the range from 0.05 to 1.0 g per liter of the first nutrient concentrate B, preferably in the range from 0.1 to 0.6 g per liter, more preferably in the range from 0.2 to 0.4 g per liter, still more preferably in the range from 0.4 to 0.2 g per liter, most preferably in the range from 0.6 to 0.15 g per liter, and in particular in the range from 0.07 to 0.09 g per liter.

[0129] A further aspect of the invention relates to a nutrient solution comprising the above-described nutrient combination according to the invention and water.

[0130] Preferably, the nutrient solution according to the invention comprises the nutrient combination according to the invention and water.

[0131] Suitable water values for use in the nutrient solution are summarized in the table below:

Parameter	Value	Value range
Water hardness	6 dH	5.0 - 10.8
pH value	7.6	6.5 - 8.2
Conductivity at 25°C	279 $\mu\text{S}/\text{cm}$	215 - 583 $\mu\text{S}/\text{cm}$
Aluminum	<0.01	0.005 - 0.026
Ammonium	<0.5	0.05 - 0.5
Arsenic	<0.0005	<0.0004
Barium	0.018	
Beryllium	<0.001	
Bismuth	<0.001	
Lead	0.0022	<0.010
Boron	0.024	<0.048
Bromide	<0.5	
Cadmium	<0.0003	<0.0001
Calcium	36	30 - 58
Chloride	15	12 - 78
Chromium	<0.001	<0.0005
Cobalt	<0.001	
Iron	<0.005	<0.020
Fluoride	<0.15	<0.20
Gallium	<0.001	
Gadolinium	<0.0001	
Potassium	1.7	1.4 - 4.8
Copper	0.5	<0.0008
Lithium	0.0023	
Magnesium	4.3	3 - 12
Manganese	<0.01	<0.005
Sodium	8.3	5 - 39
Nickel	0.001	<0.0006
Nitrite	<0.1	<0.03

Nitrate	10	10 - 19
Palladium	<0.001	
Phosphorus (orthophosphate)	<0.005	
Phosphate	<0.015	<0.04
Mercury	<0.0002	<0.00005
Scandium	<0.001	
Selenium	<0.001	<0.0006
Silver	<0.001	
Sulphate	21	14 - 66
Strontium	0.073	
Thallium	0.001	
Uranium	0.00012	<0.0005
Yttrium	<0.001	
Zinc	0.055	<0.0015

[0132] Preferably, the nutrient solution according to the invention has a total nutrient concentration in the range from 1 to 2300 ppm.

[0133] In preferred embodiments, the nutrient solution according to the invention has a total nutrient concentration of at least 500 ppm, preferably at least 600 ppm, more preferably at least 700 ppm, even more preferably at least 800 ppm, most preferably at least 900 ppm, and in particular at least 1000 ppm.

[0134] In preferred embodiments, the nutrient solution according to the invention has a total nutrient concentration in the range from 600 to 2300 ppm, preferably from 600 to 1300 ppm, more preferably from 700 to 1200 ppm, and even more preferably from 800 to 1000 ppm.

[0135] In other preferred embodiments, the nutrient solution according to the invention has a total nutrient concentration in the range from 600 to 2300 ppm, preferably from 1400 to 2300 ppm, more preferably from 1500 to 2100 ppm, and still more preferably from 1600 to 1900 ppm.

[0136] In other preferred embodiments, the nutrient solution according to the invention has a total nutrient concentration in the range from 900 to 1700 ppm, preferably from 1100 to 1500 ppm.

[0137] Preferably, the nutrient solution according to the invention has a pH in the range from 4.0 to 8.0, more preferably from 5.0 to 7.0, and more preferably from 5.6 to 6.0.

[0138] In particularly preferred embodiments, the nutrient solution according to the invention has a pH in the range of 5.5 ± 0.8 , preferably of 5.5 ± 0.6 , more preferably of 5.5 ± 0.4 , and even more preferably of 5.5 ± 0.2 .

[0139] In particularly preferred embodiments, the nutrient solution according to the invention has a pH in the range of 5.8 ± 0.8 , preferably of 5.8 ± 0.6 , more preferably of 5.8 ± 0.4 , and still more preferably of 5.8 ± 0.2 .

[0140] Preferably, the nutrient solution according to the invention has a pH of at most 7.5, preferably at most 7.0, more preferably at most 6.5, still more preferably at most 5.9, most preferably at most 5.7, and in particular at most 5.5.

[0141] Preferably, the nutrient solution according to the invention has a pH of at least 4.0, preferably at least 4.3, more preferably at least 4.6, still more preferably at least 4.9, most preferably at least 5.2, and in particular at least 5.5.

[0142] A further aspect of the invention relates to the use of the nutrient solution according to the invention for the soilless cultivation of plants.

[0143] A further aspect of the invention relates to a method for the soilless culture of plants, in particular in vertical farming over at least two levels, preferably at least three levels, the method comprising at least the steps of:

- (a) providing cuttings, seeds or planting material;
- (b) providing substrate;
- (c) sowing or planting the cuttings, seeds or planting material provided in step (a) in the substrate provided in step (b);
- (d) providing the above-described nutrient solution according to the invention;
- (e) growing the cuttings, seeds or planting material sown or planted in step (c) into seedlings, preferably until a target size is reached;
 wherein step (e) comprises contacting the substrate provided in step (b) and the nutrient solution provided in step (d);
- (f) optionally transferring the seedlings grown in step (e); and
- (g) optionally cultivating the seedlings grown in step (e) or the seedlings transferred in step (f).

[0144] Preferably, the plants of the method according to the invention are selected from the group consisting of lettuces, cabbages, herbs, fruit-bearing vegetables, in particular cucumber, tomato or bell pepper, and flower-forming herbs; preferably lettuces, cabbages and herbs; more preferably lettuce.

[0145] The plants of the method according to the invention are preferably selected from lettuce of the varieties Tirolion, Xandra, Marinski, Redial, Mineral, Hawking, Haflex, Expertise, Traject, Thurinus, Soliflore, Limambo, Kirinia, Kiribati, Exographie, Feddenas, Concentrus, and Cousteau.

[0146] Step (a) of the method according to the invention comprises providing cuttings, seeds or planting material.

[0147] For the purposes of the description, "*cuttings*" are plant materials which originate from vegetative propagation such as sections of (mother) plants. "*Planting material*" also includes tubers, roots and rhizomes.

[0148] The quantity of cuttings, seeds or planting material is preferably dependent on the germination capacity of the seeds and the desired sowing/planting density.

[0149] Step (b) of the method according to the invention comprises providing substrate.

[0150] For the purpose of the description, the "*substrate*" is the basis on which plants can thrive and germinate.

[0151] Preferably, the substrate serves the plant as a stabilizing matrix in/around which the plant can generate a stable hold via e.g. the roots; preferably by forming a root network and anchoring itself.

[0152] Preferably, the substrate has the ability to bind salts of the nutrient solution.

[0153] Preferably, the substrate comprises one or more components independently selected from the group consisting of humus, compost, grown garden soil, arable soil, coconut fibers, wood fibers, rock wool, wood wool, sphagnum moss, peat moss, perlite, sand, gravel; liquid, semi-solid or solid nutrient medium, preferably agarose gel; and synthetic materials or fibers, preferably polyvinyl chloride.

[0154] In preferred embodiments, step (b) of the method according to the invention comprises compacting the substrate.

[0155] In other preferred embodiments, the substrate is not compacted; preferably in the case of already manufactured fabric/nonwoven webs.

[0156] In preferred embodiments, the substrate provided in step (b) comprises the nutrient solution according to the invention.

[0157] In other preferred embodiments, the substrate provided in step (b) does not comprise the nutrient solution according to the invention, preferably the substrate is free of plant-available nutrients.

[0158] Preferably, the nutrient solution comprising the substrate in step (b) has a total nutrient concentration in the range from 1 to 900 ppm.

[0159] Step (c) of the method according to the invention comprises sowing or planting the cuttings, seeds or planting material provided in step (a) in the substrate provided in step (b).

[0160] Step (d) of the method according to the invention comprises providing the nutrient solution according to the invention described above.

[0161] Step (e) of the method according to the invention comprises growing the cuttings, seeds or planting material sown or planted in step (c) into seedlings, preferably until a target size is reached;

wherein step (e) comprises contacting the substrate provided in step (b) and the nutrient solution provided in step (d).

[0162] For the purposes of the description, a "*seedling*" is a young plant produced from a seed by germination from the embryo.

[0163] In preferred embodiments, the cuttings, seeds or planting material are covered from the time of sowing or cuttings.

[0164] Preferably, the cuttings, seeds or planting material are covered for 5 to 10 days, preferably for 6 to 9 days, particularly preferably for 7 to 8 days.

[0165] In preferred embodiments, the plants are exposed to light in step (e); preferably a dark phase is carried out if the plants are not exposed to light. Preferably, the exposure phase and the dark phase alternate.

[0166] Preferably, the plants are exposed to LED light in step (e).

[0167] In preferred embodiments, in step (e) the plants are exposed to light at a wavelength of 380 to 780 nm.

[0168] Preferably, in step (e), the plants are exposed to red light at a wavelength of 660 to 730 nm and/or to blue light at a wavelength of 437 to 450 nm.

[0169] Preferably, in step (e), the plants are exposed to red light at a wavelength of 660 to 730 nm and to blue light at a wavelength of 437 to 450 nm, in a ratio of 1:4 to 2:4, in particular at a ratio of 1:1, 1:4 or 2:3.

[0170] Preferably, in step (e) the plants are exposed for a duration of 10 to 24 hours per day, preferably 12 to 20 hours per day, particularly preferably 16 to 18 hours per day.

[0171] In preferred embodiments, the nutrient solution in step (e) of the method according to the invention has a total nutrient concentration in the range of 600 to 1200 ppm, preferably 800 to 1000 ppm.

[0172] In other preferred embodiments, the nutrient solution in step (e) of the method according to the invention has a total nutrient concentration in the range of 900 to 1700 ppm, preferably 1100 to 1500 ppm.

[0173] Preferably, the nutrient solution comprises at least 0.2 mL of the solution containing microorganisms and/or microbe-based preparations per liter of the nutrient solution; more preferably at least 0.4 mL, even more preferably at least 0.5 mL, most preferably at least 0.6 mL, and in particular at least 0.7 mL.

[0174] Preferably, irrigation with the nutrient solution is carried out in step (e), followed by an interruption of the irrigation.

[0175] Preferably, irrigation is carried out via the roots of the plants.

[0176] In preferred embodiments, the duration of the irrigation is for a period of 2 to 21 minutes, preferably 3 to 19 minutes, more preferably 4 to 17 minutes and most preferably 5 to 15 minutes.

[0177] Preferably, irrigation is followed by an interruption of 400 to 1440 minutes, preferably 450 to 750 minutes, particularly preferably 480 to 720 minutes.

[0178] Preferably, the irrigation in step (e) takes place independently of the exposure and dark phases.

[0179] Preferably, the temperature of the nutrient solution in step (e) is in the range from 12 to 28 °C, preferably 16.5 to 21.5 °C.

[0180] Preferably, the relative humidity in step (e) is 50 to 80%, preferably 60 to 70%. Preferably, the relative humidity is adjusted as a function of the exposure phases and the dark phases.

[0181] Preferably, in step (e), the relative humidity during the exposure of the plants is 55 to 80%, preferably 60-78%.

[0182] Preferably, in step (e) the relative humidity during the dark phase is 55-75%, preferably 57-71%.

[0183] Preferably, in step (e), the air circulation in the area of the plants is set to a range of 0.05 to 3.9 m/s, preferably 0.2 to 1.6 m/s, particularly preferably from 0.4 to 1.2 m/s.

[0184] Preferably, the air temperature is set in step (e) as a function of the exposure phases and the dark phases.

[0185] Preferably, in step (e), the temperature of the air during the exposure phases is in the range from 21 to 25 °C, preferably 21.5 to 24.5.

[0186] Preferably, in step (e), the temperature of the air during the dark phases is in the range from 17 to 22 °C, preferably 17.5 to 19.5.

[0187] Step (f) of the method according to the invention comprises transferring the seedlings grown in step (e).

[0188] In preferred embodiments, the seedlings are transferred to a culture station upon reaching a target size, preferably a growth stage.

[0189] Preferably, the target size, preferably the growth stage, is reached after 2 to 5 weeks.

[0190] Preferably, the cultivation station is a vertical shelf, column or wall system, which can preferably be automatically watered, ventilated and/or exposed to light.

[0191] In other preferred embodiments, the seedlings are not transferred; preferably, they are sown or planted directly into the final culture vessel in step (c). Preferably, the seedlings are harvested, preferably after 2 to 3 weeks.

[0192] Step (g) of the method according to the invention comprises cultivating the seedlings grown in step (e) or the seedlings transferred in step (f).

[0193] In preferred embodiments, step (g) does not involve exposing the plants to light.

[0194] In other preferred embodiments, in step (g) the plants are exposed to light, preferably LED light; preferably a dark phase is carried out if the plants are not exposed to light. Preferably, the exposure phase and the dark phase alternate.

[0195] In preferred embodiments, the plants are exposed to light at a wavelength of 380 to 780 nm in step (g).

[0196] Preferably, in step (g), the plants are exposed to red LED light at a wavelength of 660 to 730 nm and/or blue LED light at a wavelength of 437 to 450 nm.

[0197] Preferably, in step (g), the plants are exposed to red LED light at a wavelength of 660 to 730 nm and to blue LED light at a wavelength of 437 to 450 nm, at a ratio of 5:1 to 1:1, preferably at a ratio of 5:1 or 1:1.

[0198] Preferably, the plants are exposed in step (g) for a duration of 10 to 24 hours per day, preferably 12 to 20 hours per day, particularly preferably 16 to 18 hours per day.

[0199] Preferably, in step (g), the duration of the exposure depends on physiological growth parameters of the plant.

[0200] In preferred embodiments, in step (g) the plants are exposed to light for 12 to 18 hours per day to achieve flower formation, preferably 14 to 16 hours.

[0201] In other preferred embodiments, in step (g) the plants are exposed to light for 10 to 14 hours per day to achieve flower formation, preferably 11 to 13 hours.

[0202] In preferred embodiments, in step (g), the plants are exposed to light for 10 to 16 hours per day to achieve further growth, preferably 12 to 14 hours.

[0203] In other preferred embodiments, in step (g) the plants are exposed to light for 10 to 12 hours per day to achieve further growth, preferably 10 to 11 hours.

[0204] Preferably, in step (g), the plants are brought into contact with the nutrient solution according to the invention as described above.

[0205] Preferably, water of the same composition as in step (d) is used in step (g) to prepare the nutrient solution.

[0206] In preferred embodiments, the nutrient solution has a total nutrient concentration in the range of 600 to 2500 ppm, preferably 1200 to 1900 ppm.

[0207] Preferably, the nutrient solution comprises at least a total microorganism content of 50 ppm; more preferably at least 80 ppm, even more preferably at least 120 ppm, most preferably at least 150 ppm.

[0208] Preferably, in step (g), the nutrient solution is irrigated during the exposure of the plants to light, followed by an interruption of the irrigation.

[0209] Preferably, irrigation is carried out via the roots of the plants.

[0210] In preferred embodiments, the duration of the irrigation during the exposure is for a period of 3 to 10 minutes, preferably 4 to 9 minutes, more preferably 5 to 8 minutes and most preferably 5 to 6 minutes.

[0211] Preferably, after irrigation during exposure, there is an interruption of 40 to 95 minutes, preferably 45 to 90 minutes, particularly preferably 50 to 85 minutes.

[0212] In preferred embodiments, watering is carried out during the dark phase, followed by an interruption of the watering, the duration of the interruption being longer than the duration of the watering.

[0213] Preferably, the duration of watering during the dark phase is for a period of 3 to 10 minutes, preferably 4 to 9 minutes, more preferably 5 to 8 minutes and most preferably 5 to 6 minutes.

[0214] Preferably, after irrigation during the dark phase, there is an interruption of 200 to 400 minutes, preferably 250 to 350 minutes, particularly preferably 280 to 320 minutes.

[0215] Preferably, irrigation is carried out in step (g) during the exposure phase and during the dark phase.

[0216] Preferably, the irrigation is controlled during the exposure phase and/or during the dark phase as a function of the determination of the wilting point of the plant.

[0217] Preferably, the temperature of the nutrient solution is in the range from 12 to 28°C, preferably from 17.5 to 19.5°C.

[0218] Preferably, the relative humidity in step (g) is 50 to 80%, preferably 60 to 70%.

[0219] Preferably, in step (g) the relative humidity during the exposure of the plants is 55 to 80%, preferably 60-78%.

[0220] Preferably, in step (g) the relative humidity during the dark phase is 55-75%, preferably 57-71%.

[0221] Preferably, in step (g), the air circulation in the area of the plants is set to a range of 0.05 to 3.9 m/s, preferably 0.2 to 1.6 m/s, particularly preferably from 0.4 to 1.2 m/s.

[0222] Preferably, in step (g), the temperature of the air during the exposure phases is in the range of 21 to 25 °C, preferably 22.5 to 24.5 °C.

[0223] Preferably, in step (g), the temperature of the air during the dark phases is in the range from 18 to 22 °C, preferably 18.5 to 20.5.

[0224] Preferably, in step (g), the CO₂ content is regulated during the exposure phases, preferably to a content of at least 400 ppm.

[0225] Preferably, the CO₂ content is adjusted to a range from 700 to 1400 ppm, preferably from 800 to 1300 ppm, particularly preferably from 900 to 1200 ppm.

[0226] Preferably, the duration from sowing to the first partial harvest or the complete harvest of the plant is at least 14 days, preferably at least 18 days, more preferably at least 30 days, and in particular at least 32 days.

[0227] In preferred embodiments, the method according to the invention comprises the application and/or fumigation with plant, natural or synthetic growth regulators, hormones, activators, their precursors or derivatives; preferably selected from abscisic acid, auxin, cytokinin, ethylene, brassinosteroids, strigolactones, gibberellic acid, salicylic acid and jasmonic acid.

[0228] In preferred embodiments, the method according to the invention comprises mechanically injuring and/or mechanically stimulating the root and above-ground parts of the plant; preferably by cutting or trimming measures or stroking devices/stroking carts.

[0229] In preferred embodiments, the nutrients contained in the nutrient solution are dosed separately, preferably via a separate storage tank.

[0230] Preferably, the duration from sowing to the first partial harvest or complete harvest of the plant is at least 14 days, preferably at least 18 days, more preferably at least 30 days, and in particular at least 32 days.

[0231] In preferred embodiments, water changes and/or cleaning operations are carried out on water-carrying elements, in particular nutrient tanks, which are used during the process according to the invention, preferably wherein salt deposits are dissolved.

[0232] Preferably, a cleaning solution is used for cleaning, preferably a cleaning solution that is compatible with plants and foodstuffs.

[0233] Preferably, the nutrient solution tanks are completely emptied and cleaned at regular intervals, preferably at intervals of 3 to 12 weeks, preferably 4 to 5 weeks.

[0234] Preferably, after emptying the tanks, sludge and dry deposits, in particular salt deposits, are removed.

[0235] Preferably, germicidal and/or oxidizing agents are used to clean the inner surfaces of the nutrient tanks.

[0236] Preferably, the agent for cleaning contains hydrogen peroxide or ethanol.

[0237] Preferred embodiments of the invention are summarized below as sentences 1 to 124:

[0238] The following examples serve to illustrate the invention, but are not to be construed restrictively.

Example 1:

[0239] A liquid nutrient combination for the soilless culture of lettuce has been prepared from a first nutrient concentrate A and a second nutrient concentrate B. The ratio of A to B is 1:1. The composition of the nutrient combination is shown in the table below:

Molecule	Element	Factor	Molecule [%]			Element [%]			normalized to N
			in A	in B	total	in A	in B	Total	
NO ₃	N	0.2259	2.9	1.3	4.2	0.6551	0.2937	0.9488	1
P ₂ O ₅	P	0.4364	0	2.1	2.1	0	0.9165	0.9165	0.966
K ₂ O	K	0.8302	0	8.8	8.8	0	7.3053	7.3053	7.6995
SO ₃	S	0.4005	0	3.2	3.2	0	1.2815	1.2815	1.3506
B	B	1.0000	0	0.0085	0.0085	0	0.0085	0.0085	0.009
Mo	Mo	1.0000	0	0.0019	0.0019	0	0.0019	0.0019	0.002
CaO	Ca	0.7147	5.1	0	5.1	3.6449	0	3.6449	3.8416
MgO	Mg	0.6030	0.8	0	0.8	0.4824	0	0.4824	0.5085
Cu	Cu	1.0000	0.0013	0	0.0013	0.0013	0	0.0013	0.0014
Fe	Fe	1.0000	0.0447	0	0.0447	0.0447	0	0.0447	0.0471
Mn	Mn	1.0000	0.0078	0	0.0078	0.0078	0	0.0078	0.0082
Zn	Zn	1.0000	0.0093	0	0.0093	0.0093	0	0.0093	0.0098

[0240] The nutrient combination was used for the soilless cultivation of lettuce (including the varieties Tirolion, Xandra, Marinski, Redial, Mineral, Hawking, Haflex, Expertise and Cousteau). For the cultivation of seedlings, the liquid nutrient combination was diluted with water to form a nutrient solution with a total nutrient concentration of 900 ppm and the pH value of the nutrient solution was adjusted to 6.0. For the further cultivation of the seedlings or adult plants, the liquid nutrient combination was diluted with water to a nutrient solution with a total nutrient concentration of 1750 ppm and the pH value of the nutrient solution was also adjusted to 6.0.

[0241] Several adult lettuce plants (especially the varieties Mineral, Expertise, Hawking, Redial, and Cousteau) showed signs of browning on the leaf margins of the outer, older leaves (see Figures 1A, 1B and 1C). These symptoms are typically the first signs of potassium deficiency.

[0242] In addition, calcium deficiency was visible (especially in head-forming varieties such as Tirolion) as brown coloration of the leaf margins and leaf blades (tipburn) on the inner leaf tissues, i.e.

dry tissue of the youngest leaves (see Figure 2). This condition can typically also be favored by irregular watering or high humidity, which can impair calcium uptake. A calcium deficiency in the plant due to unfavorable climatic conditions could be ruled out, as the sensor readings for relative humidity were in the optimal range for lettuce cultivation (65 % on average). In addition, the CO₂ dosage was active (reaching ~1200 ppm) and the air temperature was in the range of 18 to 23 °C.

[0243] Nutrient concentrate A had a lower storage stability and the formation of salt crystals was observed after 2 months of storage.

Example 2:

[0244] A liquid nutrient combination for the soilless culture of lettuce was prepared from a first nutrient concentrate A and a second nutrient concentrate B. The ratio of A to B is 2:1. The composition of the nutrient combination is shown in the table below:

Molecule	Element	Factor	Molecule [%]			Element [%]			normalized to N
			in A	in B	total	in A	in B	Total	
NO ₃	N	0.2259	2.9	1.3	7.1	1.3102	0.2937	1.6039	1.0000
P ₂ O ₅	P	0.4364	0	2.1	2.1	0	0.9165	0.9165	0.5714
K ₂ O	K	0.8302	0	8.8	8.8	0	7.3053	7.3053	4.5547
SO ₃	S	0.4005	0	3.2	3.2	0	1.2815	1.2815	0.7990
B	B	1.0000	0	0.0085	0.0085	0	0.0085	0.0085	0.0053
Mo	Mo	1.0000	0	0.0019	0.0019	0	0.0019	0.0019	0.0012
CaO	Ca	0.7147	5.1	0	10.2	7.2899	0	7.2899	4.5450
MgO	Mg	0.6030	0.8	0	1.6	0.9649	0	0.9649	0.6016
Cu	Cu	1.0000	0.0013	0	0.0026	0.0026	0	0.0026	0.0016
Fe	Fe	1.0000	0.0447	0	0.0894	0.0894	0	0.0894	0.0557
Mn	Mn	1.0000	0.0078	0	0.0156	0.0156	0	0.0156	0.0097
Zn	Zn	1.0000	0.0093	0	0.0186	0.0186	0	0.0186	0.0116

[0245] The nutrient combination was used instead of the nutrient combination according to Example 1 for the soilless cultivation of lettuce (including the varieties Tirolion, Xandra, Marinski, Mineral, Hawking, Expertise, Traject, Soliflore and Cousteau). For the cultivation of seedlings, the liquid nutrient combination was diluted with water to form a nutrient solution with a total nutrient concentration of 1100-1500 ppm and the pH value of the nutrient solution was adjusted to 5.5. For further cultivation of the seedlings or adult plants, the liquid nutrient combination was diluted with water to form a nutrient solution with a total nutrient concentration of 1800 ppm and the pH of the nutrient solution was also adjusted to 5.5.

[0246] Compared to the nutrient solution according to Example 1, nitrogen, calcium, magnesium, copper, iron, manganese and zinc were available to the plants in higher quantities. In addition, the nutrient uptake for the plants was improved by adjusting the pH value to 5.5 instead of 6.0. This made phosphorus, potassium, calcium and boron in particular more available to the plants in the nutrient solution.

[0247] About a week after switching from the nutrient solution according to Example 1 to the nutrient solution according to Example 2, lettuce seedlings (of the Tirolion variety) that were about 3 weeks old still showed symptoms of magnesium deficiency in the form of tiny brown spots on the leaves (see Figures 3A and 3B).

[0248] Newly planted seedlings of the same sowing date (of the varieties Tirolion, Xandra, Marinski, Mineral, Hawking, Soliflore and Cousteau) only showed no symptoms of magnesium deficiency after about 3 weeks. Even after a further 2 months, the lettuce plants showed no symptoms of magnesium deficiency or calcium deficiency (see Figures 4A, 4B and 4C).

[0249] Approximately three weeks after switching from the nutrient solution according to Example 1 to the nutrient solution according to Example 2, the initial calcium deficiency condition of the adult lettuce plants (Tirolion variety) was improved. The newly formed inner leaves no longer showed brown coloration and dry leaf tips, while symptoms of calcium deficiency (caused by the nutrient combination from Example 1) were still visible on the older, outer leaves before the nutrient composition was changed. The inner leaves looked healthy and green and had crisp green tissue (see Figure 5A). Even lettuce plants (of the head-forming varieties Tirolion and Soliflore) transferred after the changeover showed no symptoms of calcium deficiency after a total of 11 weeks of cultivation (see Figure 5B).

[0250] Lettuce seedlings (of the Cousteau variety) transferred only after the changeover showed no symptoms of potassium deficiency or any other nutrient deficiency after about 2 to 3 weeks. After about another 1.5 weeks, the newly formed leaves of the Cousteau seedlings looked completely healthy and continued to show no symptoms of potassium deficiency. Plants of other apparently more potassium-susceptible varieties such as Mineral, Expertise and Redial showed no or hardly any visible symptoms of potassium deficiency on the leaf edges. Even after harvesting (and a subsequent 2-week cultivation with the root in a bowl of tap water and placed on a sunny windowsill), the lettuce plants generally showed no new symptoms of potassium or other nutrient deficiency (see Figures 6A, 6B and 6C). This indicates that the plants have good post-harvest quality.

Example 3:

[0251] A liquid nutrient combination for soilless cultivation of lettuce was prepared from a first nutrient concentrate A and a second nutrient concentrate B. The ratio of A to B is 1:1. The composition of the nutrient combination is shown in the table below:

Molecule	Element	Factor	Molecule [%]			ppm	Element [%]			normalized to N
			in A	in B	total		in A	in B	Total	
NO ₃	N	0.2259	5.8	1.3	7.1	71000	1.3102	0.2937	1.6039	1.0000
P ₂ O ₅	P	0.4364	0	2.1	2.1	21000	0	0.9165	0.9165	0.5714
K ₂ O	K	0.8302	0	8.8	8.8	88000	0	7.3053	7.3053	4.5547

SO ₃	S	0.400 5	0	3.2	3.2	3200 0	0	1.281 5	1.281 5	0.7990
B	B	1.000 0	0	0.008 5	0.008 5	85	0	0.008 5	0.008 5	0.0053
Mo	Mo	1.000 0	0	0.001 9	0.001 9	19	0	0.001 9	0.001 9	0.0012
CaO	Ca	0.714 7	7	0	7	7000 0	5.002 9	0	5.002 9	3.1191
MgO	Mg	0.603 0	1.6	0	1.6	1600 0	0.964 9	0	0.964 9	0.6016
Cu	Cu	1.000 0	0.001 7	0	0.001 7	17	0.001 7	0	0.001 7	0.0011
Fe	Fe	1.000 0	0.07	0	0.07	700	0.070 0	0	0.070 0	0.0436
Mn	Mn	1.000 0	0.016	0	0.016	160	0.016 0	0	0.016 0	0.0100
Zn	Zn	1.000 0	0.018	0	0.018	180	0.018 0	0	0.018 0	0.0112

[0252] The nutrient combination was used for the soilless cultivation of lettuce (including the varieties Tirolion, Xandra, Marinski, Mineral, Redial, Expertise, Traject, Soliflore, Kirinia, Feddenas, Concentrus and Cousteau). For the cultivation of seedlings, the liquid nutrient combination was diluted with water to form a nutrient solution with a total nutrient concentration of 900 ppm and the pH of the nutrient solution was adjusted to 5.8-5.9. For further cultivation of the seedlings or adult plants, the liquid nutrient combination was diluted with water to form a nutrient solution with a total nutrient concentration of 1700 ppm and the pH of the nutrient solution was also adjusted to 5.5.

[0253] Compared to the nutrient solution according to Example 2, calcium, copper, iron, manganese and zinc were available to the plants in slightly lower quantities.

[0254] The lettuce plants were healthy and showed no symptoms of nutrient deficiency as long as nutrients A and B were dosed evenly from the nutrient tank devices. With the exception of the Romaine lettuce variety Concentrus, which showed relatively frequent symptoms of potassium deficiency at the edges of older leaves.

[0255] Nutrient concentrate A showed a lower storage stability: after 14 days of storage, unopened canisters in the storage room (cellar with uniform ambient temperature and humidity) showed a bloated shape, which indicates unwanted gas development inside the canister.

[0256] In the nutrient concentrate A and B storage tanks, deposits in the form of fine salt crystals formed on the bottom of the tank after approx. 2-3 weeks of use. This sometimes led to frequent clogging of the dosing hoses and thus to complex cleaning of the dosing system. The irregularities in the dosing volume from the storage tanks of nutrient concentrate A and B resulting from the (increasing) clogging sometimes had the effect of a nutrient imbalance in the nutrient solution used to irrigate the plants. This was evident from the leaf symptoms of the growing plants as well as other sensory characteristics such

as atypical (dis)coloration of leaves and flowers (indication of nutrient toxicity or deficiency in lettuces as well as in other plants cultivated at the same time, such as various herbs and leafy cabbage plants), dieback symptoms and growth depression (e.g. stunted growth, increased leaf and flower shedding, rot), as well as a greater accumulation of bitter substances in leaves.

Example 4:

[0257] A liquid nutrient combination for the soilless cultivation of lettuce was produced from a first nutrient concentrate A and a second nutrient concentrate B. The ratio of A to B is 1:1. The composition of the nutrient combination is shown in the table below:

Molecule	Element	Factor	Molecule [%]			Element [%]			normalized to N
			in A	in B	total	in A	in B	Total	
NO ₃	N	0.2259	5.3	0	5.3	1.1973	0	1.1973	1.0000
P ₂ O ₅	P	0.4364	0	1.25	1.25	0	0.5455	0.5455	0.5714
K ₂ O	K	0.8302	0	6.16	6.16	0	5.1137	5.1137	4.5547
SO ₃	S	0.4005	0	3	3	0	1.2014	1.2014	0.7990
B	B	1.0000	0	0.0085	0.0085	0	0.0085	0.0085	0.0053
Mo	Mo	1.0000	0	0.0019	0.0019	0	0.0019	0.0019	0.0012
CaO	Ca	0.7147	7	0	7	5.0029	0	5.0029	3.1191
MgO	Mg	0.6030	1.6	0	1.6	0.9649	0	0.9649	0.6016
Cu	Cu	1.0000	0.0017	0	0.0017	0.0017	0	0.0017	0.0011
Fe	Fe	1.0000	0.07	0	0.07	0.0700	0	0.0700	0.0436
Mn	Mn	1.0000	0.016	0	0.016	0.0160	0	0.0160	0.0100
Zn	Zn	1.0000	0.018	0	0.018	0.0180	0	0.0180	0.0112

Example 5:

[0258] A liquid nutrient combination for the soilless cultivation of lettuce was prepared from a first nutrient concentrate A and a second nutrient concentrate B. The ratio of A to B is 1:1. The composition of the nutrient combination is shown in the table below:

Molecule	Element	Factor	Molecule [%]			Element [%]			normalized to N
			in A	in B	total	in A	in B	Total	
NO ₃	N	0.2259	4.75	0.36	5.11	1.0730	0.0813	1.1544	1.0000
NH ₄	N	0.7764	0.18	0	0.18	0.1398	0	0.1398	
P ₂ O ₅	P	0.4364	0	1.26	1.26	0	0.5499	0.5499	0.4249
K ₂ O	K	0.8302	0	6.16	6.16	0	5.1137	5.1137	3.9515
SO ₃	S	0.4005	0	3.02	3.02	0	1.2094	1.2094	0.9345
B	B	1.0000	0	0.0085	0.0085	0	0.0085	0.0085	0.0066
Mo	Mo	1.0000	0	0.0019	0.0019	0	0.0019	0.0019	0.0015
CaO	Ca	0.7147	7.01	0	7.01	5.0100	0	5.0100	3.8713
MgO	Mg	0.6030	1.6	0	1.6	0.9649	0	0.9649	0.7456
Cu	Cu	1.0000	0.0017	0	0.0017	0.0017	0	0.0017	0.0013
Fe	Fe	1.0000	0.07	0	0.07	0.0700	0	0.0700	0.0541
Mn	Mn	1.0000	0.016	0	0.016	0.0160	0	0.0160	0.0124
Zn	Zn	1.0000	0.018	0	0.018	0.0180	0	0.0180	0.0139

[0259] The nutrient combination was used for the soilless cultivation of lettuce (including the varieties Tirolion, Xandra, Marinski, Mineral, Redial, Traject, Concentrus, Thurinus, Soliflore, Limambo, Kirinia, Kiribati, Exographie, Expertise, Feddenas and Cousteau). For the cultivation of seedlings, the liquid nutrient combination was diluted with water to form a nutrient solution with a total nutrient concentration of 900 ppm at and the pH value of the nutrient solution was adjusted to 5.8. For further cultivation of the seedlings or adult plants, the liquid nutrient combination was diluted with water to form a nutrient solution with a total nutrient concentration of 1700-1800 ppm and the pH of the nutrient solution was also adjusted to 5.8.

[0260] In addition to nitrate ions, the nutrient combination also contained ammonium ions as a source of nitrogen, which resulted in a better and at the same time higher availability of nitrogen for the plants compared to Examples 1-4. In addition, boron, molybdenum, calcium, magnesium, copper, iron, manganese and zinc were slightly more available to the plants.

[0261] The liquid nutrient combination was used in various hydroponic systems for the soilless cultivation of lettuce, which showed differences particularly in the exposure of the plants to light, climate control and air circulation.

[0262] The lettuce plants were healthy in all the farming systems tested (which differed mainly in the structure of the air circulation and flow as well as the light intensity and the ratio of blue to red LEDs) and showed no symptoms of nutrient deficiency when the two nutrient concentrates A and B were dosed optimally. With the exception that the romaine lettuce variety Concentrus continued to show leaf symptoms of potassium deficiency, albeit less pronounced than when using the nutrient combination according to example 3.

[0263] No formation of crystals was observed in nutrient concentrates A and B during storage after at least 8 months. In addition, the pH value of the nutrient solution was easy to adjust.

Example 6:

[0264] A solid nutrient combination for the soilless culture of lettuce was prepared from a first nutrient concentrate A and a second nutrient concentrate B. The ratio of A to B is 1:1. The composition of the nutrient combination is shown in the table below:

Molecule	Element	Factor	Molecule [%]			Element [%] (diluted in water)			normalized to N
			in A	in B	total	in A	in B	Total	
NO ₃	N	0.2259	0	0	0	1.1521			1.0000
NH ₄	N	0.7764	0	0	0	0.1941			
CaH ₄ N ₄ O ₉	N	0.2295	100	0	100			1.2278	
P ₂ O ₅	P	0.4364	0	11.704	11.704		0.6546	0.6546	0.4863
K ₂ O	K	0.8302	0	48.377	48.377		5.1469	5.1469	3.8232
SO ₃	S	0.4005	0	26.529	26.529		1.3616	1.3616	1.0114
B	B	1.0000	0	0.066	0.066		0.0085	0.0085	0.0063

Mo	Mo	1.0000	0	0.015	0.015		0.0019	0.0019	0.0014
CaH ₄ N ₄ O ₉	Ca	0.7147	0			4.5741		4.5741	3.3977
MgO	Mg	0.6030	0	12.484	12.484		0.9649	0.9649	0.7167
Cu	Cu	1.0000	0	0.013	0.013		0.0017	0.0017	0.0013
Fe	Fe	1.0000	0	0.546	0.546		0.0700	0.07	0.0520
Mn	Mn	1.0000	0	0.125	0.125		0.0160	0.016	0.0119
Zn	Zn	1.0000	0	0.140	0.140		0.0180	0.018	0.0134

Example 7:

[0265] A solid nutrient combination for the soilless cultivation of lettuce was prepared from a first nutrient concentrate A and a second nutrient concentrate B. The ratio of A to B is 1:1. The composition of the nutrient combination is shown in the table below:

Molecule	Element	Factor	Molecule [%] (diluted in water)			Element [%] (diluted in water)			normalized to N
			in A	in B	total	in A	in B	Total	
NO ₃	N	0.2259	14.1	6.20	20.30	3.1853	1.4006	4.5859	1.0000
NH ₄	N	0.7764	1.1	0	1.1	0.8541	0	0.8541	
P ₂ O ₅	P	0.4364	0	6.1	6.1	0	2.6622	2.6622	0.4894
K ₂ O	K	0.8302	0	25.2	25.2	0	20.9198	20.9198	3.8456
SO ₃	S	0.4005	0	13.8	13.8	0	5.5264	5.5264	1.0159
B	B	1.0000	0	0.032	0.032	0	0.0320	0.0320	0.0059
Mo	Mo	1.0000	0	0.002	0.002	0	0.0020	0.0020	0.0004
CaO	Ca	0.7147	26.5	0	26.5	18.9394	0	18.9394	3.4815
MgO	Mg	0.6030	0	6.5	6.5	0	3.9198	3.9198	0.7206
Cu	Cu	1.0000	0	0.008	0.008	0	0.0080	0.0080	0.0015
Fe	Fe	1.0000	0	0.284	0.284	0	0.2840	0.2840	0.0522
Mn	Mn	1.0000	0	0.081	0.081	0	0.0810	0.0810	0.0149
Zn	Zn	1.0000	0	0.081	0.081	0	0.0810	0.0810	0.0149

[0266] The nutrient combination was used for the soilless cultivation of lettuce (including the varieties Xandra, Marinski, Mineral, Kiribati, Kirinia, Expertise, Exographie, Soliflore and Cousteau). For the cultivation of seedlings, the liquid nutrient combination was diluted with water to form a nutrient solution with a total nutrient concentration of 900 ppm and the pH value of the nutrient solution was adjusted to 5.8. For further cultivation of the seedlings or adult plants, the liquid nutrient combination was diluted with water to a nutrient solution with a total nutrient concentration of 1700-1800 ppm and the pH of the nutrient solution was also adjusted to 5.8.

[0267] Compared to the nutrient combination according to Example 5, the nutrient combination contained slightly higher levels of ammonium, potassium, manganese and zinc, and slightly lower levels of all other nutrients.

[0268] The nutrient combination was used in various hydroponic systems for the soilless cultivation of lettuce, which showed differences particularly in the exposure of the plants to light, the climate control and the air circulation.

[0269] Any amount of nutrient solution can be freshly prepared from the nutrient combination and diluted as required. The recommended concentration for preparing a nutrient solution corresponds to half the strength of the nutrient concentrates used in Example 5. By using the recommended nutrient concentration or an even more diluted solution, it is possible to operate the dosing system for at least 6 months (the maximum period currently tested) without clogging the dosing lines.

[0270] The lettuce plants were completely healthy and showed no symptoms of nutrient deficiency at the optimum dosage of the two nutrient concentrates.

Example 8:

[0271] A liquid nutrient combination for soilless cultivation of lettuce was prepared with an N : P : K ratio of 1.00 : 0.17 : 3.25. The nutrient combination was used for soilless cultivation of lettuce (of the varieties Tirolion, Hawking, Xandra, Marinski, Mineral and Cousteau).

[0272] The lettuce plants showed various symptoms of nutrient deficiency, in particular signs of potassium deficiency, calcium deficiency and magnesium deficiency.

Claims:

1. A nutrient combination for the soilless cultivation of plants, in particular in vertical farming over at least two levels, preferably at least three levels, comprising at least:
 - nitrogen, in an amount in the range from 0.001 to 15% by weight;
 - phosphorus, in an amount in the range from 0.01 to 6.0% by weight;
 - potassium, in an amount ranging from 1.0 to 30% by weight;
 - sulphur, in an amount ranging from 0.1 to 10% by weight;
 - calcium, in an amount ranging from 0.4 to 30% by weight, preferably 0.4 to 10% by weight;
 - magnesium, in an amount ranging from 0.04 to 5.0% by weight;
 - boron, in an amount ranging from 0.001 to 0.05% by weight;
 - molybdenum, in an amount ranging from 0.0005 to 0.05% by weight;
 - copper, in an amount ranging from 0.0005 to 0.05% by weight;
 - manganese, in an amount ranging from 0.001 to 0.1% by weight;
 - iron, in an amount ranging from 0.001 to 1.0% by weight; and
 - zinc, in an amount ranging from 0.001 to 0.4% by weight;

in each case based on the total weight of the nutrient combination;

optionally, microorganisms and/or microbe-based preparations, preferably consisting of chitin or toxins, selected from the group consisting of *Arthrobacter globiformis*, *Azospirillum brasilense*, *Azospirillum lipoferum*, *Azotobacter chroococcum*, *Azotobacter paspali*, *Azotobacter vinelandii*, *Bacillus amyloliquefaciens*, *Bacillus atrophaeus*, *Bacillus licheniformis*, *Bacillus megaterium*, *Bacillus pumilus*, *Bacillus subtilis*, *Bacillus thuringiensis*, *Bifidobacterium animalis*, *Bifidobacterium lactis*, *Bifidobacterium longum*, *Brevibacillus brevis*, *Cellulomonas fimi*, *Lactobacillus acidophilus*, *Lactobacillus casei*, *Lactobacillus lactis*, *Lactobacillus plantarum*, *Lactobacillus rhamnosus*, *Lactococcus lactis*, *Leuconostoc pseudomesenteroides*, *Micrococcus luteus*, *Phanerochaete chrysosporium*, *Pseudomonas aeruginosa*, *Pseudomonas argentinensis*, *Pseudomonas azotoformans*, *Pseudomonas chlororaphis*, *Pseudomonas fluorescens*, *Pseudomonas fulva*, *Pseudomonas nitroreducens*, *Pseudomonas poae*, *Pseudomonas putida*, *Pseudomonas stutzeri*, *Rhodopseudomonas palustris*, *Rhodospirillum rubrum*, *Saccharomyces cerevisiae*, *Streptococcus thermophilus*, *Streptomyces griseus*, and *Trichoderma reesei*; and

optionally, ferments selected from algae, compost, molasses and mung beans;

wherein the ratio of nitrogen to potassium is at least 1.0 : 2.0.

2. The nutrient combination according to claim 1, wherein the ratio of nitrogen to phosphorus to potassium (N : P : K) is in the range from 1.0 : 0.1 : 1.5 to 1.0 : 1.0 : 8.0, preferably from 1.0 : 0.2 : 2.5 to 1.0 : 0.7 : 6.0, more preferably from 1.0 : 0.3 : 3.5 to 1.0 : 0.5 : 4.5.
3. The nutrient combination according to claim 1 or 2, wherein the concentration of potassium is greater than the concentration of nitrogen.
4. The nutrient combination according to any one of the preceding claims, wherein the concentration of potassium is greater than the concentration of phosphorus.
5. The nutrient combination according to any one of the preceding claims, wherein the concentration of nitrogen is greater than the concentration of phosphorus.
6. The nutrient combination according to any one of the preceding claims, wherein the concentration of calcium is greater than the concentration of nitrogen.
7. The nutrient combination according to any one of the preceding claims, wherein the ratio of nitrogen to potassium (N : K) is at least 1.0 : 2.4, preferably at least 1.0 : 2.7, more preferably at least 1.0 : 3.0, even more preferably at least 1.0 : 3.3, most preferably at least 1.0 : 3.6, and in particular at least 1.0 : 3.9.
8. The nutrient combination according to any one of the preceding claims, wherein the ratio of nitrogen to potassium (N : K) is at most 1.0 : 10, preferably at most 1.0 : 8.0, more preferably at most 1.0 : 7.0, still more preferably at most 1.0 : 6.0, most preferably at most 1.0 : 5.5, and in particular at most 1.0 : 5.0.
9. The nutrient combination according to any one of the preceding claims, wherein the ratio of nitrogen to potassium (N : K) is in the range from 1.0 : 1.0 to 1.0 : 6.5, preferably from 1.0 : 1.5 to 1.0 : 6.0, more preferably from 1.0 : 2.0 to 1.0 : 5.5, even more preferably from 1.0 : 2.5 to 1.0 : 5.0, most preferably from 1.0 : 3.0 to 1.0 : 4.6, and in particular from 1.0 : 3.0 to 1.0 : 4.2.
10. The nutrient combination according to any one of the preceding claims, wherein the ratio of nitrogen to phosphorus (N : P) is at least 1.0 : 0.15, preferably at least 1.0 : 0.20, more preferably at least 1.0 : 0.25, still more preferably at least 1.0 : 0.30, most preferably at least 1.0 : 0.35, and in particular at least 1.0 : 0.40.

11. The nutrient combination according to any one of the preceding claims, wherein the ratio of nitrogen to phosphorus (N : P) is at most 1.0 : 1.0, preferably at most 1.0 : 0.9, more preferably at most 1.0 : 0.8, still more preferably at most 1.0 : 0.7, most preferably at most 1.0 : 0.6, and in particular at most 1.0 : 0.5.
12. The nutrient combination according to any one of the preceding claims, wherein the ratio of nitrogen to phosphorus (N : P) is in the range from 1.0 : 0.15 to 1.0 : 0.9, preferably from 1.0 : 0.2 to 1.0 : 0.8, more preferably from 1.0 : 0.25 to 1.0 : 0.7, even more preferably from 1.0 : 0.3 to 1.0 : 0.6, most preferably from 1.0 : 0.35 to 1.0 : 0.5, and in particular from 1.0 : 0.35 to 1.0 : 0.45.
13. The nutrient combination according to any one of the preceding claims, wherein the ratio of nitrogen to calcium (N : Ca) is at least 1.0 : 2.4, preferably at least 1.0 : 2.7, more preferably at least 1.0 : 3.0, even more preferably at least 1.0 : 3.3, most preferably at least 1.0 : 3.6, and in particular at least 1.0 : 3.9.
14. The nutrient combination according to any one of the preceding claims, wherein the ratio of nitrogen to calcium (N : Ca) is at most 1.0 : 10, preferably at most 1.0 : 8.0, more preferably at most 1.0 : 7.0, still more preferably at most 1.0 : 6.0, most preferably at most 1.0 : 5.5, and in particular at most 1.0 : 5.0.
15. The nutrient combination according to any one of the preceding claims, wherein the ratio of nitrogen to calcium (N : Ca) is in the range from 1.0 : 0.4 to 1.0 : 8.0, preferably from 1.0 : 1.0 to 1.0 : 6.5, more preferably from 1.0 : 1.5 to 1.0 : 6.0, even more preferably from 1.0 : 2.0 to 1.0 : 5.5, most preferably from 1.0 : 2.5 to 1.0 : 5.0, and in particular from 1.0 : 2.5 to 1.0 : 3.5.
16. The nutrient combination according to any one of the preceding claims, which comprises sodium.
17. The nutrient combination according to any one of the preceding claims, which comprises chlorine.
18. The nutrient combination according to any one of the preceding claims, which comprises a nitrogen source selected from the group consisting of calcium nitrate, sodium nitrate, potassium nitrate, ammonium nitrate, monoammonium phosphate, diammonium phosphate, triammonium phosphate, ammonium sulfate, ammonium thiosulfate, ammonium chloride, ammonia, calcium

cyanamide, calcium ammonium nitrate, urea, ammonium lignosulfonate, ammonium bifluoride, and ammonium heptamolybdate; preferably calcium nitrate.

19. The nutrient combination according to any one of the preceding claims, comprising a phosphorus source selected from the group consisting of phosphorus pentoxide, phosphoric acid, monoammonium phosphate, diammonium phosphate, triammonium phosphate, potassium pyrophosphate, sodium pyrophosphate, potassium phosphate, and sodium phosphate; preferably phosphorus pentoxide.
20. The nutrient combination according to any one of the preceding claims, comprising a potassium source selected from the group consisting of potassium oxide, potassium chloride, potassium sulfate, potassium carbonate, potassium acetate, potassium citrate, potassium hydroxide, potassium manganate, potassium phosphate, potassium molybdate, potassium thiosulfate, and potassium nitrate; preferably potassium oxide.
21. The nutrient combination according to any one of the preceding claims, comprising a sulfur source selected from the group consisting of ammonium sulfate, calcium sulfate, potassium sulfate, magnesium sulfate, sulfuric acid, cobalt sulfate, copper sulfate, iron sulfate, sulfur trioxide, and sulfur; preferably sulfur trioxide.
22. The nutrient combination according to any one of the preceding claims, which comprises a calcium source selected from the group consisting of calcium nitrate, calcium cyanamide, calcium acetate, calcium borate, calcium carbonate, calcium chloride, calcium citrate, calcium lactate, calcium oxide, calcium sulfate, calcium tartrate, calcium ammonium nitrate, and calcium lignosulfonate; preferably calcium oxide or calcium carbonate.
23. The nutrient combination according to any one of the preceding claims, which comprises a magnesium source selected from the group consisting of magnesium oxide, magnesium acetate, magnesium borate, magnesium chloride, magnesium citrate, magnesium nitrate, magnesium phosphate, and magnesium sulfate; preferably magnesium oxide.
24. The nutrient combination according to any one of the preceding claims, which comprises a boron source selected from the group consisting of boric acid, calcium borate, potassium borohydride, borax, boron trioxide, potassium tetraborate, sodium borate, sodium borohydride, and sodium tetraborate.

25. The nutrient combination according to any one of the preceding claims, comprising a source of molybdenum selected from the group consisting of molybdic acid, calcium molybdate, potassium molybdate, sodium molybdate, and ammonium molybdate.
26. The nutrient combination according to any one of the preceding claims, comprising a copper source selected from the group consisting of copper acetate, copper chlorate, copper chloride, copper citrate, copper nitrate, and copper sulfate.
27. The nutrient combination according to any one of the preceding claims, comprising a manganese source selected from the group consisting of manganese acetate, manganese chloride, manganese nitrate, manganese phosphate, and manganese sulfate.
28. The nutrient combination according to any one of the preceding claims, comprising a iron source selected from the group consisting of iron chloride, iron citrate, iron nitrate, iron oxide, iron citrate, iron sulfate, and iron sulfonate.
29. The nutrient combination according to any one of the preceding claims, comprising a zinc source selected from the group consisting of zinc oxide, zinc acetate, zinc chloride, zinc citrate, zinc nitrate, and zinc sulfate.
30. The nutrient combination according to any one of the preceding claims, wherein the nutrient combination comprises nitrogen in an amount of at least 0.2% by weight of the nutrient combination, preferably at least 0.4% by weight, more preferably at least 0.6% by weight, still more preferably at least 0.8% by weight, most preferably at least 1.0% by weight, and in particular at least 1.2% by weight, in each case based on the total weight of the nutrient combination.
31. The nutrient combination according to any one of the preceding claims, wherein the nutrient combination comprises nitrogen in an amount of at most 3.5% by weight of the nutrient combination, preferably at most 3.0% by weight, more preferably at most 2.5% by weight, even more preferably at most 2.0% by weight, most preferably at most 1.6% by weight, and in particular at most 1.2% by weight, in each case based on the total weight of the nutrient combination.
32. The nutrient combination according to any one of the preceding claims, wherein the nutrient combination comprises nitrogen in an amount in the range from 0.005 to 8.0% by weight of the nutrient combination, preferably in the range from 0.01 to 6.0% by weight, more preferably in the range from 0.015 to 4.0% by weight, even more preferably in the range from 0.2 to 2.0% by

weight, most preferably in the range from 0.6 to 1.5% by weight, and in particular in the range from 1.0 to 1.25% by weight, in each case based on the total weight of the nutrient combination.

33. The nutrient combination according to any one of the preceding claims, wherein the nutrient combination comprises phosphorus in an amount of at least 0.4% by weight of the nutrient combination, preferably at least 0.5% by weight, more preferably at least 0.6% by weight, even more preferably at least 0.7% by weight, most preferably at least 0.8% by weight, and in particular at least 0.9% by weight, in each case based on the total weight of the nutrient combination.
34. The nutrient combination according to any one of the preceding claims, wherein the nutrient combination comprises phosphorus in an amount of at most 3.0% by weight of the nutrient combination, preferably at most 2.5% by weight, more preferably at most 2.0% by weight, even more preferably at most 1.5% by weight, most preferably at most 1.0% by weight, and in particular at most 0.8% by weight, in each case based on the total weight of the nutrient combination.
35. The nutrient combination according to any one of the preceding claims, wherein the nutrient combination comprises phosphorus in an amount in the range from 0.05 to 5.0% by weight of the nutrient combination, preferably in the range from 0.1 to 2.5% by weight, more preferably in the range from 0.2 to 1.8% by weight, even more preferably in the range from 0.3 to 1.4% by weight, most preferably in the range from 0.4 to 1.2% by weight, and in particular in the range from 0.5 to 1.0% by weight, in each case based on the total weight of the nutrient combination.
36. The nutrient combination according to any one of the preceding claims, wherein the nutrient combination comprises potassium in an amount of at least 2.5% by weight of the nutrient combination, preferably at least 3.0% by weight, more preferably at least 3.5% by weight, even more preferably at least 4.0% by weight, most preferably at least 4.5% by weight, and in particular at least 5.0% by weight, in each case based on the total weight of the nutrient combination.
37. The nutrient combination according to any one of the preceding claims, wherein the nutrient combination comprises potassium in an amount of at most 8.5% by weight of the nutrient combination, preferably at most 8.0% by weight, more preferably at most 7.5% by weight, even more preferably at most 7.0% by weight, most preferably at most 6.5% by weight, and in particular at most 6.0% by weight, in each case based on the total weight of the nutrient combination.
38. The nutrient combination according to any one of the preceding claims, wherein the nutrient combination comprises potassium in an amount in the range from 2.0 to 8.5% by weight of the nutrient

combination, preferably in the range from 2.5 to 8.0% by weight, more preferably in the range from 3.0 to 7.5% by weight, even more preferably in the range from 3.5 to 7.0% by weight, most preferably in the range from 4.0 to 6.5% by weight, and in particular in the range from 4.5 to 6.0% by weight, in each case based on the total weight of the nutrient combination.

39. The nutrient combination according to any one of the preceding claims, wherein the nutrient combination comprises sulfur in an amount in the range from 0.2 to 5.0% by weight of the nutrient combination, preferably in the range from 0.4 to 3.0% by weight, more preferably in the range from 0.6 to 2.5% by weight, even more preferably in the range from 0.8 to 2.0% by weight, most preferably in the range from 1.0 to 1.5% by weight, and in particular in the range from 1.2 to 1.3% by weight, in each case based on the total weight of the nutrient combination.
40. The nutrient combination according to any one of the preceding claims, wherein the nutrient combination comprises calcium in an amount of at least 3.0% by weight of the nutrient combination, preferably at least 3.5% by weight, more preferably at least 4.0% by weight, even more preferably at least 4.5% by weight, most preferably at least 5.0% by weight, and in particular at least 5.5% by weight, in each case based on the total weight of the nutrient combination.
41. The nutrient combination according to any one of the preceding claims, wherein the nutrient combination comprises calcium in an amount of at most 8.5% by weight of the nutrient combination, preferably at most 8.0% by weight, more preferably at most 7.5% by weight, even more preferably at most 7.0% by weight, most preferably at most 6.5% by weight, and in particular at most 6.0% by weight, in each case based on the total weight of the nutrient combination.
42. The nutrient combination according to any one of the preceding claims, wherein the nutrient combination comprises calcium in an amount in the range from 0.5 to 9.5% by weight of the nutrient combination, preferably in the range from 1.0 to 9.0% by weight, more preferably in the range from 2.0 to 8.5% by weight, even more preferably in the range from 3.0 to 8.0% by weight, most preferably in the range from 4.0 to 7.5% by weight, and in particular in the range from 5.0 to 7.0% by weight, in each case based on the total weight of the nutrient combination.
43. The nutrient combination according to any one of the preceding claims, wherein the nutrient combination comprises magnesium in an amount in the range from 0.05 to 4.0% by weight of the nutrient combination, preferably in the range from 0.1 to 3.0% by weight, more preferably in the range from 0.2 to 2.5% by weight, even more preferably in the range from 0.4 to 2.0% by weight,

most preferably in the range from 0.6 to 1.5% by weight, and in particular in the range from 0.8 to 1.0% by weight, in each case based on the total weight of the nutrient combination.

44. The nutrient combination according to any one of the preceding claims, which comprises at most 50% by weight of a growth-promoting component comprising a copolymer of fulvic acid and polymetallic humates (CPFAPH), based on the total weight of the nutrient combination; preferably at most 30% by weight, and more preferably at most 10% by weight, based on the total weight of the nutrient combination; even more preferably, the nutrient combination does not comprise any growth-promoting component comprising a copolymer of fulvic acid and polymetallic humates (CPFAPH).
45. The nutrient combination according to any one of the preceding claims, which is solid, preferably a powder.
46. The nutrient combination according to any one of claims 1 to 45, which is liquid.
47. The nutrient combination claim 46, wherein the nutrient combination comprises nitrogen in an amount of at least 0.2 g per liter of the nutrient combination, preferably at least 0.4 g per liter, more preferably at least 0.6 g per liter, even more preferably at least 0.8 g per liter, most preferably at least 1.0 g per liter, and in particular at least 1.2 g per liter.
48. The nutrient combination according to claim 46 or 47, wherein the nutrient combination comprises nitrogen in an amount of at most 3.5 g per liter of the nutrient combination, preferably at most 3.0 g per liter, more preferably at most 2.5 g per liter, still more preferably at most 2.0 g per liter, most preferably at most 1.6 g per liter, and in particular at most 1.2 g per liter.
49. The nutrient combination according to any one of claims 46 to 48, wherein the nutrient combination comprises nitrogen in an amount ranging from 0.005 to 8.0 g per liter of the nutrient combination, preferably ranging from 0.01 to 6.0 g per liter, more preferably ranging from 0.015 to 4.0 g per liter, even more preferably ranging from 0.2 to 2.0 g per liter, most preferably ranging from 0.6 to 1.5 g per liter, and more preferably ranging from 1.0 to 1.25 g per liter.
50. The nutrient combination according to any one of claims 46 to 49, wherein the nutrient combination comprises phosphorus in an amount of at least 0.4 g per liter of the nutrient combination, preferably at least 0.5 g per liter, more preferably at least 0.6 g per liter, even more preferably at least 0.7 g per liter, most preferably at least 0.8 g per liter, and in particular at least 0.9 g per liter.

51. The nutrient combination according to any one of claims 46 to 50, wherein the nutrient combination comprises phosphorus in an amount of at most 3.0 g per liter of the nutrient combination, preferably at most 2.5 g per liter, more preferably at most 2.0 g per liter, still more preferably at most 1.5 g per liter, most preferably at most 1.0 g per liter, and in particular at most 0.8 g per liter.
52. The nutrient combination according to any one of claims 46 to 51, wherein the nutrient combination comprises phosphorus in an amount ranging from 0.05 to 5.0 g per liter of the nutrient combination, preferably ranging from 0.1 to 2.5 g per liter, more preferably ranging from 0.2 to 1.8 g per liter, even more preferably ranging from 0.3 to 1.4 g per liter, most preferably ranging from 0.4 to 1.2 g per liter, and more preferably ranging from 0.5 to 1.0 g per liter.
53. The nutrient combination according to any one of claims 46 to 52, wherein the nutrient combination comprises potassium in an amount of at least 2.5 g per liter of the nutrient combination, preferably at least 3.0 g per liter, more preferably at least 3.5 g per liter, even more preferably at least 4.0 g per liter, most preferably at least 4.5 g per liter, and in particular at least 5.0 g per liter.
54. The nutrient combination according to any one of claims 46 to 53, wherein the nutrient combination comprises potassium in an amount of at most 8.5 g per liter of the nutrient combination, preferably at most 8.0 g per liter, more preferably at most 7.5 g per liter, still more preferably at most 7.0 g per liter, most preferably at most 6.5 g per liter, and in particular at most 6.0 g per liter.
55. The nutrient combination according to any one of claims 46 to 54, wherein the nutrient combination comprises potassium in an amount ranging from 2.0 to 8.5 g per liter of the nutrient combination, preferably ranging from 2.5 to 8.0 g per liter, more preferably ranging from 3.0 to 7.5 g per liter, even more preferably ranging from 3.5 to 7.0 g per liter, most preferably ranging from 4.0 to 6.5 g per liter, and more preferably ranging from 4.5 to 6.0 g per liter.
56. The nutrient combination according to any one of claims 46 to 55, wherein the nutrient combination comprises sulfur in an amount ranging from 0.2 to 5.0 g per liter of the nutrient combination, preferably ranging from 0.4 to 3.0 g per liter, more preferably ranging from 0.6 to 2.5 g per liter, even more preferably ranging from 0.8 to 2.0 g per liter, most preferably ranging from 1.0 to 1.5 g per liter, and more preferably ranging from 1.2 to 1.3 g per liter.
57. The nutrient combination according to any one of claims 46 to 56, wherein the nutrient combination comprises calcium in an amount ranging from 0.5 to 9.5 g per liter of the nutrient

combination, preferably ranging from 1.0 to 9.0 g per liter, more preferably ranging from 2.0 to 8.5 g per liter, even more preferably ranging from 3.0 to 8.0 g per liter, most preferably ranging from 4.0 to 7.5 g per liter, and more preferably ranging from 5.0 to 7.0 g per liter.

58. The nutrient combination according to any one of claims 46 to 57, wherein the nutrient combination comprises magnesium in an amount ranging from 0.05 to 4.0 g per liter of the nutrient combination, preferably ranging from 0.1 to 3.0 g per liter, more preferably ranging from 0.2 to 2.5 g per liter, even more preferably ranging from 0.4 to 2.0 g per liter, most preferably ranging from 0.6 to 1.5 g per liter, and more preferably ranging from 0.8 to 1.0 g per liter.
59. The nutrient combination according to any one of claims 46 to 58, wherein the nutrient combination comprises boron in an amount in the range of 0.002 to 0.035 g per liter of the nutrient combination, preferably in the range of 0.003 to 0.03 g per liter, more preferably in the range from 0.004 to 0.025 g per liter, even more preferably in the range from 0.005 to 0.02 g per liter, most preferably in the range from 0.006 to 0.015 g per liter, and in particular in the range from 0.007 to 0.009 g per liter.
60. The nutrient combination according to any one of claims 46 to 59, wherein the nutrient combination comprises molybdenum in an amount in the range of 0.001 to 0.002 g per liter of the nutrient combination.
61. The nutrient combination according to any one of claims 46 to 60, wherein the nutrient combination comprises copper in an amount ranging from 0.001 to 0.002 g per liter of the nutrient combination.
62. The nutrient combination according to any one of claims 46 to 61, wherein the nutrient combination comprises manganese in an amount in the range of 0.002 to 0.05 g per liter of the nutrient combination, preferably in the range of 0.003 to 0.04 g per liter, more preferably in the range from 0.004 to 0.03 g per liter, even more preferably in the range from 0.005 to 0.025 g per liter, most preferably in the range from 0.006 to 0.02 g per liter, and in particular in the range from 0.007 to 0.016 g per liter.
63. The nutrient combination according to any one of claims 46 to 62, wherein the nutrient combination comprises iron in an amount ranging from 0.002 to 0.5 g per liter of the nutrient combination, preferably ranging from 0.005 to 0.3 g per liter, more preferably ranging from 0.01 to 0.2 g per

liter, even more preferably ranging from 0.02 to 0.15 g per liter, most preferably ranging from 0.03 to 0.12 g per liter, and more preferably ranging from 0.04 to 0.09 g per liter.

64. The nutrient combination according to any one of claims 46 to 63, wherein the nutrient combination comprises zinc in an amount in the range of from 0.002 to 0.2 g per liter of the nutrient combination, preferably in the range of from 0.005 to 0.16 g per liter, more preferably in the range from 0.01 to 0.12 g per liter, even more preferably in the range from 0.007 to 0.08 g per liter, most preferably in the range from 0.008 to 0.04 g per liter, and in particular in the range from 0.009 to 0.02 g per liter.
65. The nutrient combination according to any one of claims 46 to 64, which comprises
 - nitrogen, in an amount in the range from 0.001 to 10 g;
 - phosphorus, in an amount in the range from 0.01 to 6.0 g;
 - potassium, in an amount ranging from 1.0 to 10 g;
 - sulphur, in an amount ranging from 0.1 to 6.0 g;
 - calcium, in an amount ranging from 0.4 to 10 g;
 - magnesium, in an amount ranging from 0.04 to 5.0 g;
 - boron, in an amount ranging from 0.001 to 0.05 g;
 - molybdenum, in an amount ranging from 0.0005 to 0.05 g;
 - copper, in an amount in the range of 0.0005 to 0.05 g;
 - manganese, in a quantity ranging from 0.001 to 0.1 g;
 - iron, in an amount ranging from 0.001 to 1.0 g; and
 - zinc, in an amount ranging from 0.001 to 0.4 g;
 in each case per liter of the nutrient combination.
66. The nutrient combination according to any one of claims 46 to 65, comprising a first nutrient concentrate A and a second nutrient concentrate B.
67. The nutrient combination according to claim 66, wherein the nutrient concentrate A comprises nitrogen, calcium, magnesium, copper, manganese, iron and/or zinc.

68. The nutrient combination according to claim 66 or 67, wherein the nutrient concentrate B comprises nitrogen, phosphorus, potassium, sulphur, boron and/or molybdenum.
69. The nutrient combination according to any one of claims 66 to 68, wherein the first nutrient concentrate A and the second nutrient concentrate B are present in a quantitative ratio of 1:2 to 2:1.
70. The nutrient combination according to any one of claims 66 to 69, wherein the first nutrient concentrate A comprises nitrogen in an amount of at least 0.1 g per liter of the first nutrient concentrate A, preferably at least 0.2 g per liter, more preferably at least 0.4 g per liter, even more preferably at least 0.6 g per liter, most preferably at least 0.8 g per liter, and in particular at least 1.0 g per liter.
71. The nutrient combination according to any one of claims 66 to 70, wherein the first nutrient concentrate A comprises nitrogen in an amount of at most 3.5 g per liter of the first nutrient concentrate A, preferably at most 3.0 g per liter, more preferably at most 2.5 g per liter, still more preferably at most 2.0 g per liter, most preferably at most 1.6 g per liter, and in particular at most 1.2 g per liter.
72. The nutrient combination according to any one of claims 66 to 71, wherein the first nutrient concentrate A comprises nitrogen in an amount in the range from 0.05 to 8.0 g per liter of the first nutrient concentrate A, preferably in the range from 0.1 to 6.0 g per liter, more preferably in the range from 0.15 to 4.0 g per liter, even more preferably in the range from 0.2 to 2.0 g per liter, most preferably in the range from 0.6 to 1.5 g per liter, and in particular in the range from 1.0 to 1.25 g per liter.
73. The nutrient combination according to any one of claims 66 to 72, wherein the first nutrient concentrate B comprises nitrogen in an amount of at least 0.1 g per liter of the first nutrient concentrate B, preferably at least 0.2 g per liter, more preferably at least 0.4 g per liter, even more preferably at least 0.6 g per liter, most preferably at least 0.7 g per liter, and in particular at least 0.08 g per liter.
74. The nutrient combination according to any one of claims 66 to 73, wherein the first nutrient concentrate B comprises nitrogen in an amount of at most 0.5 g per liter of the first nutrient concentrate B, preferably at most 0.3 g per liter, more preferably at most 0.25 g per liter, still more preferably at most 0.2 g per liter, most preferably at most 0.15 g per liter, and in particular at most 0.09 g per liter.

75. The nutrient combination according to any one of claims 66 to 74, wherein the first nutrient concentrate B comprises nitrogen in an amount in the range from 0.05 to 1.0 g per liter of the first nutrient concentrate B, preferably in the range from 0.1 to 0.6 g per liter, more preferably in the range from 0.2 to 0.4 g per liter, even more preferably in the range from 0.4 to 0.2 g per liter, most preferably in the range from 0.6 to 0.15 g per liter, and in particular in the range from 0.07 to 0.09 g per liter.
76. A nutrient solution comprising the nutrient combination according to any of the preceding claims and water.
77. The nutrient solution according to claim 76, which has a total nutrient concentration in the range from 1 to 2300 ppm.
78. The nutrient solution according to claim 76 or 77, which has a total nutrient concentration of at least 500 ppm, preferably at least 600 ppm, more preferably at least 700 ppm, still more preferably at least 800 ppm, most preferably at least 900 ppm, and in particular at least 1000 ppm.
79. The nutrient solution according to any one of claims 76 to 78, which has a total nutrient concentration in the range from 600 to 2300 ppm, preferably from 600 to 1300 ppm, more preferably from 700 to 1200 ppm, and even more preferably from 800 to 1000 ppm.
80. The nutrient solution according to any one of claims 76 to 78, which has a total nutrient concentration in the range of from 600 to 2300 ppm, preferably from 1400 to 2300 ppm, more preferably from 1500 to 2100 ppm, and still more preferably from 1600 to 1900 ppm.
81. The nutrient solution according to any one of claims 76 to 80, which has a pH in the range from 4.0 to 8.0, preferably from 5.0 to 7.0, and more preferably from 5.6 to 6.0.
82. The nutrient solution according to any one of claims 76 to 81, which has a pH in the range of 5.5 ± 0.8 , preferably of 5.5 ± 0.6 , more preferably of 5.5 ± 0.4 , and still more preferably of 5.5 ± 0.2 .
83. The nutrient solution according to any one of claims 76 to 82, which has a pH of at most 7.5, preferably at most 7.0, more preferably at most 6.5, still more preferably at most 5.9, most preferably at most 5.7, and in particular at most 5.5.

84. The nutrient solution according to any one of claims 76 to 83, which has a pH of at least 4.0, preferably at least 4.3, more preferably at least 4.6, still more preferably at least 4.9, most preferably at least 5.2, and in particular at least 5.5.
85. A method for the soilless cultivation of plants, in particular in vertical farming over at least two levels, preferably at least three levels, the method comprising at least the steps of:
- (a) Providing cuttings, seeds or planting material;
 - (b) providing substrate;
 - (c) sowing or planting the cuttings, seeds or planting material provided in step (a) in the substrate provided in step (b);
 - (d) providing the nutrient solution according to any one of claims 76 to 84;
 - (e) growing the cuttings, seeds or planting material sown or planted in step (c) into seedlings, preferably until a target size is reached;
wherein step (e) comprises contacting the substrate provided in step (b) and the nutrient solution provided in step (d);
 - (f) optionally transferring the seedlings grown according to step (e); and
 - (g) optionally cultivating the seedlings grown in step (e) or the seedlings transferred in step (f).
86. The method according to claim 85, wherein the plants are selected from the group consisting of lettuces, cabbages, herbs, fruit-bearing vegetables, in particular cucumber, tomato or bell pepper, and flower-forming herbs; preferably lettuces, cabbages, and herbs; more preferably lettuce.
87. The method according to claim 85 or 86, wherein the substrate comprises one or more components independently selected from the group consisting of humus, compost, grown garden soil, arable soil, coconut fibers, wood fibers, rock wool, wood wool, sphagnum moss, peat moss, perlite, sand, gravel; liquid, semi-solid or solid nutrient medium, preferably agarose gel; and synthetic materials or fibers, preferably polyvinyl chloride.
88. The method according to any one of claims 85 to 87, wherein step (b) comprises compacting the substrate.
89. The method according to any one of claims 85 to 88, wherein the substrate provided in step (b) comprises nutrient solution according to any one of claims 76 to 84.

90. The method according to claim 89, wherein the nutrient solution has a total nutrient concentration in the range from 1 to 900 ppm.
91. The method according to any one of claims 85 to 90, wherein the cuttings, seeds or planting material are covered from the time of sowing or cuttings.
92. The method according to claim 91, wherein the planting material are covered for 5 to 10 days, preferably for 6 to 9 days, particularly preferably for 7 to 8 days.
93. The method according to any one of claims 85 to 92, wherein the plants are exposed to light in step (e); preferably a dark phase is carried out if the plants are not exposed to light.
94. The method according to claim 93, wherein the plants are exposed to LED light in step (e).
95. The method according to claim 93 or 94, wherein in step (e) the plants are exposed to light at a wavelength of 380 to 780 nm.
96. The method according to any one of claims 93 to 95, wherein in step (e) the plants are exposed to red light at a wavelength of 660 to 730 nm and/or to blue light at a wavelength of 437 to 450 nm.
97. The method according to any one of claims 93 to 96, wherein in step (e) the plants are exposed to red light at a wavelength of 660 to 730 nm and to blue light at a wavelength of 437 to 450 nm, in a ratio of 1:4 to 2:4, in particular at a ratio of 1:1, 1:4 or 2:3.
98. The method according to any one of claims 93 to 97, wherein in step (e) the plants are exposed for a duration of from 10 to 24 hours per day, preferably from 12 to 20 hours per day, more preferably from 16 to 18 hours per day.
99. The method according to any one of claims 85 to 98, wherein in step (e) the nutrient solution has a total nutrient concentration in the range of 600 to 1200 ppm, preferably 800 to 1000 ppm.
100. The method according to any one of claims 85 to 99, wherein irrigation with the nutrient solution is carried out in step (e), followed by an interruption of the irrigation.
101. The method according to claim 100, wherein the irrigation is carried out via the roots of the plants.

102. The method according to claim 100 or 101, wherein the duration of the irrigation is for a period of 2 to 21 minutes, preferably 3 to 19 minutes, more preferably 4 to 17 minutes and most preferably 5 to 15 minutes.
103. The method according to any one of claims 100 to 102, wherein the irrigation is followed by an interruption of 400 to 1440 minutes, preferably 450 to 750 minutes, more preferably 480 to 720 minutes.
104. The method according to any one of claims 85 to 103, wherein the temperature of the nutrient solution in step (e) is in the range of 12 to 28 °C, preferably 16.5 to 21.5 °C.
105. The method according to any one of claims 85 to 104, wherein in step (e) the relative humidity is 50 to 80%, preferably 60 to 70%.
106. The method according to any one of claims 85 to 105, wherein in step (e) the relative humidity during the exposure of the plants is 55 to 80%, preferably 60-78%.
107. The method according to any one of claims 85 to 106, wherein in step (e) the relative humidity during the dark phase is 55-75%, preferably 57-71%.
108. The method according to any one of claims 85 to 107, wherein in step (e) the air circulation in the area of the plants is set to a range of 0.05 to 3.9 m/s, preferably 0.2 to 1.6 m/s, particularly preferably from 0.4 to 1.2 m/s.
109. The method according to any one of claims 85 to 108, wherein in step (e) the temperature of the air during the exposure phases is in the range from 21 to 25 °C, preferably 21.5 to 24.5.
110. The method according to any one of claims 85 to 109, wherein in step (e) the temperature of the air during the dark phases is in the range from 17 to 22 °C, preferably 17.5 to 19.5.
111. The method according to any one of claims 85 to 110, wherein the seedlings are transferred to a culture station upon reaching a target size, preferably a growth stage.
112. The method according to claim 111, wherein the target size, preferably the growth stage, is reached after 2 to 5 weeks.

113. The method according to claim 111 or 112, wherein the cultivation station is a vertical shelf, column or wall system, which can preferably be automatically watered, ventilated and/or exposed to light.
114. The method according to any one of claims 85 to 113, wherein step (g) does not involve exposing the plants to light.
115. The method according to any one of claims 85 to 114, wherein in step (g) the plants are exposed to light, preferably LED light; preferably a dark phase is carried out if the plants are not exposed to light.
116. The method according to claim 115, wherein in step (g) the plants are exposed to light at a wavelength of 380 to 780 nm.
117. The method according to claim 115 or 116, wherein in step (g) the plants are exposed to red LED light at a wavelength of 660 to 730 nm and/or blue LED light at a wavelength of 437 to 450 nm.
118. The method according to any one of claims 115 to 117, wherein in step (g) the plants are exposed to red LED light at a wavelength of 660 to 730 nm and to blue LED light at a wavelength of 437 to 450 nm, at a ratio of 5:1 to 1:1, preferably at a ratio of 5:1 or 1:1.
119. The method according to any one of claims 115 to 118, wherein the plants are exposed in step (g) for a duration of 10 to 24 hours per day, preferably from 12 to 20 hours per day, more preferably from 16 to 18 hours per day.
120. The method according to any one of claims 115 to 120, wherein in step (g) the duration of the exposure depends on physiological growth parameters of the plant.
121. The method according to claim 120, wherein in step (g) the plants are exposed to light for 12 to 18 hours per day to achieve flower formation, preferably 14 to 16 hours.
122. The method according to claim 120, wherein in step (g) the plants are exposed to light for 10 to 14 hours per day to achieve flower formation, preferably 11 to 13 hours.
123. The method according to claim 120, wherein in step (g) the plants are exposed to light for 10 to 16 hours per day to achieve further growth, preferably 12 to 14 hours.

124. The method according to claim 120, wherein in step (g) the plants are exposed to light for 10 to 12 hours per day to achieve further growth, preferably 10 to 11 hours.
125. The method according to any one of claims 85 to 124, wherein in step (g) the plants are brought into contact with the nutrient solution according to any one of claims 76 to 84.
126. The method according to claim 125, wherein in step (g) water of the same composition as in step (d) is used to prepare the nutrient solution.
127. The method according to claim 125 or 126, wherein the nutrient solution has a total nutrient concentration in the range of 600 to 2500 ppm, preferably 1200 to 1900 ppm.
128. The method according to any one of claims 125 to 127, wherein in step (g) the nutrient solution is irrigated during the exposure of the plants to light, followed by an interruption of the irrigation.
129. The method according to any one of claims 125 to 128, wherein the irrigation is carried out via the roots of the plants.
130. The method according to any one of claims 125 to 129, wherein the duration of the irrigation during the exposure is for a period of 3 to 10 minutes, preferably 4 to 9 minutes, more preferably 5 to 8 minutes and most preferably 5 to 6 minutes.
131. The method according to any one of claims 125 to 130, wherein after the irrigation during the exposure, there is an interruption of 40 to 95 minutes, preferably 45 to 90 minutes, more preferably 50 to 85 minutes.
132. The method according to any one of claims 125 to 131, wherein watering is carried out during the dark phase, followed by an interruption of the watering, the duration of the interruption being longer than the duration of the watering.
133. The method according to any one of claims 125 to 132, wherein the duration of the watering during the dark phase is for a period of 3 to 10 minutes, preferably 4 to 9 minutes, more preferably 5 to 8 minutes and most preferably 5 to 6 minutes.

134. The method according to any one of claims 125 to 133, wherein after the irrigation during the dark phase, there is an interruption of 200 to 400 minutes, preferably 250 to 350 minutes, more preferably 280 to 320 minutes takes place.
135. The method according to any one of claims 125 to 134, wherein the irrigation is controlled during the exposure phase and/or during the dark phase as a function of the determination of the wilting point of the plant.
136. The method according to any one of claims 125 to 135, wherein the temperature of the nutrient solution is in the range from 12 to 28°C, preferably from 17.5 to 19.5°C.
137. The method according to any one of claims 85 to 136, wherein the relative humidity in step (g) is 50 to 80%, preferably 60 to 70%.
138. The method according to any one of claims 85 to 137, wherein in step (g) the relative humidity during the exposure of the plants is 55 to 80%, preferably 60-78%.
139. The method according to any one of claims 85 to 138, wherein in step (g) the relative humidity during the dark phase is 55-75%, preferably 57-71%.
140. The method according to any one of claims 85 to 139, wherein in step (g) the air circulation in the area of the plants is set to a range of 0.05 to 3.9 m/s, preferably 0.2 to 1.6 m/s, particularly preferably from 0.4 to 1.2 m/s.
141. The method according to any one of claims 85 to 140, wherein in step (g) the temperature of the air during the exposure phases is in the range of 21 to 25 °C, preferably 22.5 to 24.5 °C.
142. The method according to any one of claims 85 to 141, wherein in step (g) the temperature of the air during the dark phases is in the range of 18 to 22 °C, preferably 18.5 to 20.5 °C.
143. The method according to any one of claims 85 to 142, wherein in step (g) the CO₂ content is regulated during the exposure phases, preferably to a content of at least 400 ppm.
144. The method according to claim 143, wherein the CO₂ content is adjusted to a range from 700 to 1400 ppm, preferably from 800 to 1300 ppm, more preferably from 900 to 1200 ppm.

145. The method according to any one of claims 85 to 144, wherein the duration from sowing to the first partial harvest or the complete harvest of the plant is at least 14 days, preferably at least 18 days, more preferably at least 30 days, and in particular at least 32 days.
146. The method according to any one of claims 85 to 145, wherein water changes and/or cleaning operations are carried out on water-carrying elements, in particular nutrient tanks, which are used during the method, preferably wherein salt deposits are dissolved.
147. The method according to claim 146, wherein a cleaning solution is used for cleaning, preferably cleaning solution that is compatible with plants and foodstuffs.
148. The method according to claim 146 or 147, wherein the nutrient solution tanks are completely emptied and cleaned at regular intervals, preferably at intervals of 3 to 12 weeks, preferably of 4 to 5 weeks.
149. The method according to any one of claims 146 to 148, wherein after emptying the tanks, sludge and dry deposits, in particular salt deposits, are removed.
150. The method according to any one of claims 146 to 149, wherein germicidal and/or oxidizing agents are used to clean the inner surfaces of the nutrient tanks.
151. The method according to claim 150, wherein the agent for cleaning comprises hydrogen peroxide or ethanol.