

Grow Program: Mum Propagation

Feeding Recommendation

Beginning from day of sticking: Water in with Nature's Source 10-4-3 or 10-4-5 at a rate of 300 ppm N and continue through the mist system on the first 3-5 cycles per day. Direct Inject setting of 1:400 (a line cleaner should be used during a fresh water mist to ensure lines stay clean)

The frequency and duration of the mist depends on many environmental factors and varies from season to season and throughout the day.

Once cutting is callused, increase rate to 400 ppm N. Direct Inject setting of 1:300.

At this time, apply an initial application of Plant Probiotic at a rate of ¼ lb. per 50 gallons of water.

A weekly application of Nature's Source Foliar Essentials encourages a more compact growth habit with increased tone, while enhancing nutrient uptake.

Nature's Source Benefits: Nature's Source is derived from oilseed extract, providing a low salt index. Mums grown with Nature's Source will have deeper green foliage, toned with reduced stress, since not being grown with a salt based synthetic fertilizer. More tone provides enhanced shipping quality.

Injector Ratio Chart

ppm N	250 ppm	300 ppm	400 ppm	500 ppm	600 ppm
Injector Ratio	1:500	1:400	1:300	1:250	1:200

Tank Mix Chart

Desired ppm of N	oz. of 10-4-3 or 10-4-5 per gallon	oz. of 10-4-3 or 10-4-5 per 50 gallons
100	3.5	0.7
300	7.0	1.4
500	10.5	2.0
600	21.0	4.0

Stock tank solutions are not recommended. When stock tank is mixed, Solution should be kept fresh and covered. To be used within 48-72 hours. Sanitize with an organic sanitizing spray on top of solution if held longer than 72 hours.

**ALWAYS AGITATE THE PLANT FOOD BEFORE ADDING OT STOCK TANK
ALWAYS AGITATE THE DILUTION PRIOR TO EACH USE**

Nature's Source is made with oilseed extract which contains 20 plant-essential amino acids, silicon, and organic compounds (see reverse).

Note: This program assumes soil media, water source and climate control is ideal. Adjustments will also be necessary based upon a strain's growth habit and actual flower timing.

- **Soil Media** – Use only well drained professional soil media products with a small organic nutrient or compost component with a beginning EC under 1.5 mS/cm
- **Water Source** – Treat high alkalinity water, (above 100 ppm), with acid neutralization for a stabile water pH of 6.5. High EC water, above .5 mS/cm, will require regular EC monitoring and possible remediation through leaching and/or water treatment.
- **Strain Adjustment** – Plan to reduce or eliminate the high rates in Vegetative Stage 2 for dwarf and early flowering strains; some strains may need reduction to half the recommended rate of Nature's Source 10-4-3 or 10-4-5

Referenced Products

Nature's Source® Professional Plant Food 10-4-3

Nature's Source® Nursery & Landscape Special Plant Food 10-4-5

Nature's Source® Plant Probiotic

Nature's Source® Foliar Essentials BioNutrition™ Spray

Website: www.NS-PF.com

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NATURE'S
SOURCE®

Oilseed Extract: Key Organic Compounds

Includes 20 Plant Essential Amino Acids, Essential Vitamins, Hormones and Minerals*

AMINO ACIDS	Role**
Alanine	Only amino acid that can operate in anaerobic and N-limiting conditions. Helps plants deal with flood and N-limiting conditions.
Arginine	Amino acid in plants that acts as an important nitrogen reserve and recycling, but also as a precursor of the biosynthesis of polyamines, nitric oxide and so on. Polyamines and nitric oxide are important messengers involved in almost all physiological and biochemical processes, growth & development, and adaptation of plants to stress. (http://www.ncbi.nlm.nih.gov/pubmed/17287563)
Asparagine	Affects nitrogen transport and storage efficiency
Aspartic Acid	Significantly improves nutrient acquisition by the plant through artificially increasing the volume of phosphorus fertilizer occupied by increasing root branching and root hair development. (https://docs.google.com/viewer?url=patentimages.storage.googleapis.com/pdfs/US5350735.pdf)
Cysteine	Can increase H ₂ S production in soil. An important negative effect of H ₂ S on plant growth is an inhibition of the energy-dependent process of N uptake. (https://wap.aslo.org/lo/toc/vol_35/issue_2/0399.pdf)
Glutamic Acid	Fundamental metabolite in the formation of vegetable tissue and chlorophyll synthesis. Fundamental to plant growth.
Glutamine	Builds key enzyme involved in assimilating inorganic nitrogen
Glycine	Plant growth regulator to slow the maturation process of some fruit by temporarily suppressing ethylene production. Slows fruit ripening in some plants.
Histidine	Supplying histidine to a non-accumulating species greatly increases both its nickel tolerance and capacity for nickel transport to the shoot. (http://www.nature.com/nature/journal/v379/n6566/abs/379635a0.html)
Isoleucine	Critical for protein synthesis and normal plant growth, while also providing precursors for a number of secondary metabolites such as; cyanogenic glycosides, glucosinolates, and acyl-sugars.
Leucine	Involved in plant defense and resistance to pathogens.
Lysine	Impacts gene expression; regulates flowering time and hormone response.
Methionine	L-methionine is an established precursor of ethylene and its application to soil has shown positive effect on plant growth. Has also been shown to increase C ₂ H ₄ accumulation in the soil atmosphere. (http://www.pakbs.org/pjbot/PDFs/41(5)/PJB41(5)2455.pdf)
Phenylalanine	Starting compound used in the flavonoid biosynthesis. Key component to antioxidant production, may improve flavors.
Proline	Protects membranes and proteins against the adverse effects of high concentrations of inorganic ions and temperature extremes. Increases plants ability to deal with temperature stress.
Serine	Fundamental role in metabolism, linked to root development.
Threonine	Protein kinases frequently attach phosphates to Threonines in order to facilitate the signal transduction process. Helps uptake phosphates.
Tryptophan	Can increase IAA concentrations in soil. IAA can increase internodal elongation.
Tyrosine	Important role in photosynthesis, electron donor in chloroplasts
Valine	Essential amino acid for plant growth

OTHER ORGANIC COMPOUNDS	**Role
Vitamin C	Antioxidant and, in association with other components of the antioxidant system, protects plants against oxidative damage resulting from aerobic metabolism, photosynthesis and a range of pollutants. All vitamins are essential to plant growth and help deal with stress.
Vitamin D3	Affects Ca absorption and Ca-mediated cellular functions (signaling). Ca helps hold cell membranes together.
Alpha-Tocopherol	Natural vitamin E, antioxidant deactivates photosynthesis-derived reactive oxygen species (mainly 1O ₂ and OH), and prevents the propagation of lipid peroxidation, contribute to plant stress tolerance.
Thiamine (B1)	B1 can assist at any time in a plant's life with root regeneration where the root system has been damaged or stressed through high salinity, pathogens such as pythium, nutrient deficiencies and toxicities. Rapidly broken down by microbes in the nutrient solution. (http://www.quickgrow.com/gardening_articles/plant_hormones.html)
Riboflavin (B2)	Induced expression of pathogenesis-related (PR) genes in the plants, suggesting its ability to trigger a signal transduction pathway that leads to systemic resistance. (http://apsjournals.apsnet.org/doi/abs/10.1094/PHTO.2000.90.8.801)
Phenols	Released from decomposing plant litter, can be transformed into insoluble and recalcitrant humic substances, form chelates with aluminum or iron ions (immobilizes metals). Can lock up heavy metals within the soil, making them immobile.
Silica (SiO ₂)	Silica is the 2nd most abundant element in the soil and effectively reduces susceptibility of plants to pests. (http://www.jpep.ir/browse.php?a_id=140&slc_lang=fa&sid=1&ftxt...%E2%80%8E)
Silicon (Si)	Promotes disease and insect resistance, structural fortification, and regulation of the uptake of other ions. (http://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=2373&context=etd)
Total Phenolics	Indicates antioxidant capacity
Indole Acetic Acid (IAA)	Plant Growth Hormone
Protein	Proteins are made up of amino acids, which hold non-soluble N. ~6.25 * N(%) = Protein(%)
Fat	Hold C,H,O

HORMONES	**Role
Gibberellins (GAs)	plant hormones that regulate growth and influence various developmental processes, including stem elongation, germination, dormancy, flowering, sex expression, enzyme induction, and leaf and fruit senescence.
Cytokinins (CK)	a class of plant growth substances (phytohormones) that promote cell division, or cytokinesis, in plant roots and shoots. They are involved primarily in cell growth and differentiation, but also affect apical dominance, axillary bud growth, and leaf senescence.
Auxins	a class of plant hormones (or plant growth regulators) with some morphogen-like characteristics. Auxins have a cardinal role in coordination of many growth and behavioral processes in the plant's life cycle and are essential for plant body development.

* Data by third party lab

** Scientifically noted roles of organic compounds in plant production