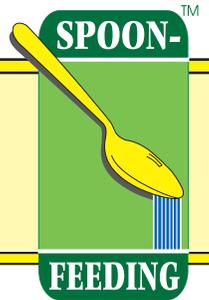


Nutriculture[®]



Water-Soluble Fertilizer Product Manual

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About Plant Marvel

Established in 1922, Plant Marvel Laboratories pioneered and popularized the use of water soluble fertilizers. We introduced our original 12-31-14 General Purpose Hi Phosphate formulation over 87 years ago helping to fuel the growth of soilless growing and hydroponics. Some years later we found a way to incorporate soluble forms of minor and trace elements into our expanding line of soluble N-P-K fertilizers. This became the first commercial fertilizer to deliver a total nutrient feed to crops without fear of burning and with unparalleled ease of application. It provided almost instant response because all nutrients were in a form the plants could utilize immediately. We called it Nutriculture.

Over the years, we helped pioneer the concept of foliar feeding and widespread use of water solubles in the commercial market. But our most important innovation has been the incorporation of all necessary trace elements into every N-P-K formula we manufacture. Today this practice is becoming standard with all fertilizer manufacturers.

Industry Leadership

We are proud of Plant Marvel's leadership in the horticultural industry. Our list of Firsts includes:

First to produce a high-concentrate, economical water-soluble fertilizer.

First to incorporate minor and trace minerals in significant quantities and in a soluble form that was readily available to plants.

First to market a starter solution for faster development of new crops.

First to promote various formulas specifically designed for the changing needs of crops at different stages of growth.

First to develop fertilizers specifically to offset the effect of crops suffering from toxicity caused by excess mineral content in the water or soil.

First to promote ratios to accomplish specific growth characteristics.

First to develop the Cal-Mag soluble fertilizers that contain NPK plus significant levels of Calcium, Magnesium and minor elements all in one blend. (See our Cal-Mag fertilizers.)

Diversification

Throughout the years Plant Marvel Laboratories has grown with the industry it services. We began by selling our fertilizers to florists and growers. Today the number of fertilizer formulas we stock is over fifty, and we have developed another 200 or more special non-stock formulas. Each of these was designed to promote or overcome a specific growth characteristic.

We are committed to ongoing research in the agriculture and horticulture fields. As new research indicates a need for new formulations, we develop new products and new formulas to help fill those needs. Some of the product brands developed are:

Nutriculture® soluble fertilizers.

Nutriculture® Plus soluble fertilizers with increased levels of trace elements.

Mor-Green® iron chelate compound.

Mag-Iron® chelated iron and magnesium compound

Sol-Trace® soluble trace element mix.

Chemec® B chelated minor element complex.

The professional floral market has been a part of our company for most of our years. Our brand names include the following.

Nutriculture[®] fertilizers

Lustre-Glo[®] leaf polish

Spring Rain[®] liquid fertilizer

Silk ReNu[®] artificial plant cleaners

Silk ReNu[®] dried and artificial plant freshener

Manufacturing

Our plant and office complex in Chicago Heights, Illinois, is located on a five acre site just 20 miles south of Chicago in the heart of the Midwest. The area is at the crossroads of several major interstate highways and rail lines, making it ideal for shipping.

Streamlined computer-controlled manufacturing procedures and our modern warehouse give us the capacity to produce and serve more customers and yet still deliver promptly.

Superior Quality Control

Our strict quality control system is the toughest in the industry. We use only the highest quality ingredients. Every shipment of each one of our raw materials is tested before we use it. Every batch is tested before we release it for shipment, and we keep a sample so we can always verify the quality. Each bag of finished product is also coded with a quality control number before shipment. If there is a complaint or a problem in the field this QC number enables us to immediately pull out our retained sample and obtain fast answers.

Our specially designed processing machinery produces a homogeneous mix that is almost instantly soluble even in cold water, faster yet in hot water. Homogeneity insures that the first scoop out of the bag will contain the same nutrient mix in the same proportions as the last scoop. Computer control of our mixing process enables us to precisely determine the contents of every bag of our fertilizer. We know that keeping our eye on quality means no guesswork for growers. Our customers can depend upon Nutriculture for even, predictable growth of their crops.

Growing a Quality Crop

Growing a quality crop consistently doesn't happen by accident. It is usually the result of repeating successful procedures and eliminating practices that have proven disastrous in prior years. By starting with high quality seed or seedlings, a growing media that is sterile, uniform and consistent, offers the proper pH and will not create complications with the addition of chemicals such as fungicides, insecticides, growth retardants or fertilizers, the grower begins to gain control.

More control is gained by taking the next step in a long line of steps to eliminate variables. A major one being enclosing the crop in glass or plastic. Others being choice of containers, controlled temperatures, lighting or shading.

Another step may mean media testing, especially if soil has been used as a component. Knowing water quality is a must; Not only pH and buffering capacity but nutrient values as well. Water that comes from a well should probably be checked several times during a growing season.

Duplicating cultural practices year after year and developing a trained eye so that trouble can be spotted before it gets out of hand is the most practical method of growing successfully. Corrective action can usually be taken with just visual checks of problems as they develop, however if there is any



doubt, then tissue analysis should be done to confirm it.

To help establish a successful crop on a repeat basis, records should be maintained that indicate what treatments have been made and when. To aid the grower in this regard, Plant Marvel has made available free of charge, waterproof **Cards** that can be used in the greenhouse and then saved and referred to for next years crop.

What a grower does in the area of nutritional control can have more effect on a crop's growth characteristics than any of the other components. It is in this area that

the **Nutriculture**[®] concept can pay off handsomely. By utilizing growing media that is sterile, properly pH balanced and for the most part, void of any nutritional contribution, the crops nutritional requirements can be met and corrected as needed, virtually on a daily basis through the use of various **Nutriculture**[®] formulations. **Plant Marvels Nutriculture**[®] formulations supply most of the elements that a plant requires for healthy growth and they are provided in a highly refined and soluble form that makes the growers job of applying them easier.

The elements are blended in the proper ratios so that most crops can be grown from start to finish by using no more than two or three selected formulas. Generally, these are: a high phosphate starter to get the plants established; then, a formula that was designed for the particular crop being grown. Some crops may benefit from the addition of a finisher formula, and others might require an alternate formula to provide a particular element such as calcium. The use of two or three formulas throughout a crops growth cycle helps to make the growers job of nutrition control easier.

To put it simply, there is no better way to grow a quality crop than to put the grower in control of everything that will influence its growth, provide him with an effective means of corrective action for nutritional problems and keep records so that successes can be repeated.

Controlling Nutrition

The Nutriculture® Concept

Giving the grower control over his crops nutrition by providing all the elements necessary for growth in a form that is readily available and that will produce immediate results is the basis of the **Nutriculture®** concept. This will allow him to vary the formulas at different stages of growth to obtain the growth characteristics he desires, and to make timely corrections to his crops diet as the need arises. Feeding **Nutriculture®** formulas will produce steady, sturdy growth from seedling or cutting to mature plant because they provide a complete diet. **Nutriculture®**

has the advantage of permitting the grower to feed the formula that best suits the plants' requirements at a given stage of growth without unbalancing nutrition. At the same time, the grower can supply a complete food and avoid the danger of



checking the crops' growth because of a nutritional deficiency. A regular program of feeding crops from start to finish with various formulas in the **Nutriculture®** line will meet the requirements of any crop at any stage of growth.

Spoon Feeding™

Feeding small amounts frequently of a **Nutriculture®** formula to maintain good color and growth characteristics is the basis of **Spoon Feeding™**. It is more than just a constant feed program.

Spoon Feeding™ also embodies a program of constant feeding with **Nutriculture®** fertilizers in a efficient way to achieve greater production and higher quality plants with less labor and at less cost per square foot of bench area than using any other type feeds. In addition to the obvious advantage of combining feeding and watering in one operation, the **Spoon Feeding™ System** also gives growers greater control over the growth and health of their crops.

Unless nutrients supplied are in an immediately available form that a plant can utilize in the short span of time between waterings, their grower does not have control. Instead, when using fertilizers or soils made up of organic or slow release materials, vital nutrition is left to the uncertainties of time, temperature, microbial activity and/or moisture.

To avoid these problems, most greenhouse growers today are using artificial growing media that is sterile and essentially inert in terms of nutritional value, but that does provide good drainage, proper pH and moisture holding capacity, feeding smaller quantities more often. They then feed every time they water (constant **Spoon Feeding™**) or once every seven to fourteen days.

Keeping Accurate Records

Records are the key to duplicating a successful crop in the future. We recommend that growers keep records of feedings and treatments given to each crop along with pertinent observations on results. This enables him to see where improvement is needed in his program and also enables him to duplicate desirable results.

Plant Marvel supplies **Bench Crop Record** Cards on waterproof paper for this purpose. The cards can be clipped to benches for the duration of a crops' growth and notations made on the spot with pencil or waterproof pen. When the crop is finished, the cards can be washed off and filed for easy

Fertilizer Elements

Fertilizer Elements - Their role in Plant Nutrition

Knowing the affect of each element on plants helps to determine which formula to use in a given situation to achieve optimal growth or correct problems. All elements perform vital functions in plant nutrition and many factors influence how available these elements are for use by the plant, including pH, solubility, and even the presence of other elements.

Plant Marvel has developed it's own exclusive chelating system which has enabled us to put higher levels of the essential trace elements into our **Nutriculture®** formulas than any of our competition, and still deliver a totally soluble feed that will stay in solution from the mix tank until absorbed by the plant.

The role of the various elements is briefly described below.

Nitrogen (N)

Promotes rapid vegetative growth and is responsible for the depth of green color. Deficiency is indicated by small leaves, short spindly growth and yellowing of leaves followed by leaf drop.

Phosphorus (P)

Stimulates root formation and hastens development of young plants; develops hardiness and promotes flowering and seed formation. Deficiency is indicated by reddish-purple tint to dull green leaves with short shoot growth and weak stunted new growth.

Potash (K)

Promotes vigor and resistance to disease, stiffens stems and also develops hardiness in plants. Aids formation and translocation of carbohydrates (starches,

sugars) and is essential for strong root systems. Acts as a balance to nitrogen and other plant food elements. Deficiency is indicated by margin chlorosis followed by tissue death.

The following secondary and trace elements are also essential for healthy plants.

Calcium (Ca)

An important secondary element which is not compatible with phosphorus in a solution. Because of this, it should be added to the growing media in the form of dolomitic lime when required. To overcome calcium deficiencies quickly, see the product description sheet on the following pages of our **Hi-Cal Special 15-0-15 or Cal 20-0-20**. Calcium deficiency is indicated by chlorosis of new growth, distorted foliage with leaf tips hooked back.

Magnesium (Mg)

An essential ingredient of chlorophyll and aids in the absorption and translocation of phosphorus and increases yield and quality of crops. Deficiencies occur on older leaves as interveinal chlorosis.

The following elements act as catalysts to bring about reactions in the plant that are beneficial in building disease resistance.

Sulphur (S)

Essential in protein formation. It creates an acid zone in the soil that helps plants assimilate other nutrients that are only slightly soluble; acts as a soil conditioner and can be responsible for increased crop growth and response to feeding. Deficiency is indicated by uniform yellowing of all growth.

Boron (B)

Affects the utilization of starches and sugars. Deficiencies cause distortion of young terminal growth.

Copper (Cu)

Activates iron and other elements. It inhibits abnormal growth due to the presence of excessive nitrogen. Deficiency is indicated by tissue death, mottling of new leaves and distorted new growth.

Iron (Fe)

Precludes the possibility of iron deficiency by releasing iron in the soil to the plant without excluding the assimilation by the plant of other food elements. Deficiency is indicated by chlorosis (yellowing) between veins followed by bleaching of leaves to a cream color in severe cases.

Manganese (Mn)

Affects the process of photosynthesis and oxidation of iron and the other minerals for assimilation by the crop. It helps overcome chlorotic conditions in the plant's upper leaves. Deficiency is indicated by chlorosis (yellowing) marked by prominent dark green veins.

Molybdenum (Mo)

Aids in transformation of nitrate nitrogen into protein. Deficiency is indicated by tissue death on leaf margins and leaves that don't fully expand or leaf burn due to nitrate accumulation in leaves.

Zinc (Zn)

Regulates growth and production of protein. Deficiency is indicated by short internodes and small narrow leaves.

Monitoring Nutrition

Modern research and instrumentation enables growers to efficiently monitor and thus more fully control the nutritional status of any crop. The benefits of greater control are higher yields, more profuse blooms, and better quality plants.

With liquid feeding, less soil testing is required because the nutrient levels of the growing medium do not fluctuate to the extent that they do with other feeding methods. Because liquid feeds are immediately available to plants upon application, as opposed to the sometimes very slow release of nutrients by dry fertilizers, the amount of nutrients held in the soil becomes relatively unimportant. The concern, rather, is with the plant and the quantity of nutrients it has assimilated. With a liquid feeding program, tissue tests can give a far more accurate picture of the nutritional status of a crop than soils tests alone. Fertilizer application must be geared toward maintaining or establishing a nutritional balance within the plant. By applying a complete formula with each feeding, the metabolism of the plant will not be affected nor will photosynthesis be interfered with by any nutritional imbalance or deficiency.

Using a Conductivity Meter

Monitoring the fertilizer content of irrigation water through the use of a conductivity meter is a good way to verify that the proper amount of nutrients is actually being applied. The conductivity test will also help determine that the fertilizer was mixed properly and that the proportioner, if one is being used, is working properly.

An electrical conductivity meter measures the amount of electricity that will pass through a liquid. The conductivity of a solution will vary with amount of dissolved salts that are contained in it. Since most soluble fertilizers are mineral salts, with the possible exception of urea, which is an organic compound, the addition of increasing amounts of fertilizer to water will increase the electrical conductivity of the water.

Distilled water has no conductivity. Tap water or well water will contain a certain amount of naturally occurring dissolved salts and will give a reading on a conductivity meter. This value should be taken into consideration when determining the conductive value of a solution.

Electrical conductivity measurements are usually expressed as mho's. Mho is the meter-kilogram-second unit of electrical conductance. Conductivity of fertilizer solutions is sufficiently small to be measured in millimho's (MMho's, one one-thousandth of an mho) or micromho's (umho's, on millionth of an mho).

Nutriculture® Conductivity Values

All fertilizers are not composed of the same ingredients and therefore will not have the same conductivity reading even though they were diluted the same. Each **Nutriculture®** formula listed in this manual has its own conductivity chart with readings in millimho's from 50 PPM nitrogen to 500 PPM nitrogen.

These values are based on readings taken with distilled water and should be accurate to within plus or minus ten percent of the desired reading. The grower should remember to deduct the value of the water source from readings taken of the fertilizer solution being applied. This subtraction must be done before referring to the **Nutriculture®** conductivity charts.

The handy chart on the next page gives conductivity values for 34 popular **Nutriculture®** formulas. Below the chart are simple instructions for figuring the conductivity of your fertilizer solution.

Water Quality Affects Plant Nutrition

Growers should have their irrigation water tested at least twice a year by a good laboratory that is experienced in identifying all properties of a sample that may affect plant nutrition.

Who Does Water Testing?

A list of laboratories that conduct the appropriate test is included under our "Resources" section at the end of this manual.

Nutriculture Conductivity Chart

Formulations and Conductivity in Millimhos (mmhos)

This chart has been developed as a reference to verify the accuracy of fertilizer injectors. The chart is designed to be used in the following manner:

1. Determine the conductivity of your clear irrigation water.
2. Determine the conductivity of your fertilizer solution after it has been proportioned (at the emitter as it is applied to the plants).
3. Subtract the value of 1. (clear water) from 2. (fertilizer solution).
4. Compare this answer with the values on the chart to determine the parts per million of nitrogen being injected.

An Example:

If a reading of irrigation water has a value of .2 mmhos and a value of 1.0 mmhos is obtained from the fertilizer-injected water using 20-20-20, the corrected value would be 1.0 - .2 = .80. A look at the chart indicates a value of .82 for 20-20-20 being injected at 200 PPM. With an allowance of + or - 10% this is well within range. To convert millimhos (mmhos) to micromhos (umhos) multiply by 1000.

The values on this chart were obtained under laboratory conditions using distilled water. The values obtained by the grower under field conditions could therefore, vary slightly (±10%) from values listed here. This chart is to be used with Plant Marvel's Nutriculture formulations. Other brands may be composed of different raw materials which would give different values, even though they are the same analysis.

FORMULA	PPM NITROGEN CONCENTRATION						
	50	100	150	200	300	400	
4-25-35	1.30	2.60	3.90	5.20	7.80	10.40	13.00
5-40-17	1.43	2.85	4.28	5.70	8.55	11.40	14.25
7-40-17	.60	1.20	1.80	2.40	3.60	4.80	6.00
10-20-30	.50	.99	1.50	1.99	2.99	3.98	4.79
10-30-20	.48	.96	1.44	1.92	2.88	3.84	4.95
12-4-12	.17	.35	1.07	1.43	2.14	2.86	3.58
12-31-14	.42	.84	1.25	1.67	2.51	3.34	4.18
12-45-10	.36	.71	1.07	1.42	2.13	2.84	3.55
13-0-44	.48	.95	1.41	1.88	2.83	3.77	4.73
13-2-13	.37	.75	1.12	1.50	2.25	3.00	3.75
14-0-14	.37	.75	1.12	1.50	2.25	3.00	3.75
14-3-20	.35	.71	1.06	1.42	2.12	2.83	3.55
15-0-15	.34	.69	1.03	1.38	2.06	2.75	3.44
15-0-30	.36	.71	1.07	1.49	2.14	2.85	3.55
15-3-18	.35	.71	1.06	1.42	2.12	2.83	3.54
15-3-20	.35	.70	1.05	1.40	2.10	2.80	3.50
15-5-15	.36	.73	1.09	1.45	2.18	2.90	3.63
15-5-25	.38	.76	1.14	1.52	2.28	3.04	3.80
15-5-30	.37	.74	1.11	1.47	2.21	2.95	3.68
15-10-30	.35	.71	1.06	1.42	2.12	2.83	3.54
15-20-25	.33	.66	1.00	1.37	2.05	2.74	3.42
15-30-15	.32	.64	.96	1.28	1.93	2.57	3.21
16-4-12	.33	.68	1.01	1.35	2.04	2.70	3.37
17-0-17	.35	.70	1.05	1.40	2.10	2.80	3.50
17-5-17	.34	.68	1.01	1.37	2.04	2.70	3.40
17-17-17	.27	.54	.80	1.07	1.61	2.14	2.68
18-3-18	.34	.68	1.01	1.37	2.04	2.74	3.40
18-6-18	.34	.68	1.01	1.37	2.04	2.74	3.40
19-26-14	.21	.42	.63	.84	1.25	1.67	2.09
20-0-20	.21	.41	.62	.82	1.23	1.64	2.05
20-5-20	.33	.65	.98	1.30	1.96	2.62	3.25
20-5-30	.23	.47	.70	.93	1.39	1.86	2.33
20-7-19	.30	.60	.90	1.20	1.80	2.40	3.00
20-7-20	.33	.65	.99	1.30	1.95	2.60	3.25
20-10-20	.31	.62	.94	1.25	1.88	2.50	3.13
20-20-20	.21	.41	.62	.82	1.23	1.64	2.05
21-7-7 A	.31	.61	.92	1.22	1.83	2.44	3.05
21-7-7 N	.18	.36	.54	.72	1.07	1.43	1.80
21-8-18	.32	.64	.96	1.28	1.92	2.56	3.20
24-8-16	.21	.42	.63	.85	1.27	1.70	2.12
25-0-25	.15	.30	.45	.61	.92	1.22	1.52
25-5-20	.14	.30	.42	.61	.90	1.20	1.50
25-10-20	.16	.32	.49	.65	.98	1.30	1.63
25-15-10	.15	.31	.46	.62	.92	1.23	1.55
28-18-8	.10	.20	.30	.40	.60	.80	1.00
30-10-10	.11	.22	.33	.43	.66	.85	1.10

Controlling pH

Controlling pH

pH is a measure of acidity or basicity (alkalinity). The pH scale ranges from very acidic (0 to 7.0) to very basic (7.0 to 14.0). The mid-point on the scale (7.0) is neutral.

Soil or growing media pH affects the ability of plants to absorb nutrients and water through their roots. Most greenhouse crops grow best in media or soil with a pH between 5.5 and 7.2. Certain species such as azaleas, blue hydrangeas and gardenias require a more acidic medium ranging from between 4.5 to 5.5. Soilless growing mixes usually produce the best results with a pH level that is one or two points lower on the pH scale than is desirable when growing the same plants in soil or organic mixes.

On a constant feed program, the pH of the growing medium is far more important than its fertility. Because water, fertilizers, and chemicals change the pH of the medium, periodic pH testing is very important. Maintenance of proper pH in the growing medium and irrigation water is the best way of insuring that the nutrients supplied by the fertilizer are readily available to the plants. If the pH is outside of the plants' tolerance, nutrients applied in fertilizer may become locked up in the medium and unavailable to the plants, or conversely, the plant may take up toxic levels of certain nutrients.

Testing pH

Growers need to know the pH range tolerated by each of their crops. Growing media should be tested periodically in order to detect excessive acidity or basicity before any symptoms of sickness appear in the plants.

A number of good pH meters are on the market, from simple to complex. Your distributor can advise you on a model that is best suited to your needs.

Adjusting pH

Most pre-mixed growing media comes with its pH already adjusted. However, it's always a good idea to verify that it's within range. When preparing a new growing media or steam sterilizing an older mix, it is wise to take a pH reading and make any necessary corrections at this time.

Raising the pH level one-half to one unit on the scale might require five pounds of ground dolomitic limestone for each 100 square feet of bench area or for each 40 bushels of media. Lowering the pH by same amount would require one-half pound of finely ground sulphur for each 100 square feet of bench area or

for each 40 bushels of media. Allow about three months for these corrections to reach the extent of their acidity or basicity in the treated soil.

Potential Acidity and Basicity

The label on each **Nutriculture**[®] bag lists the potential acidity of that formula. Potential acidity is the amount of acidic residue that could potentially form as a result of applying one ton of the formula. This value is expressed as a measure of the amount of lime required to restore the growing medium to a neutral pH.

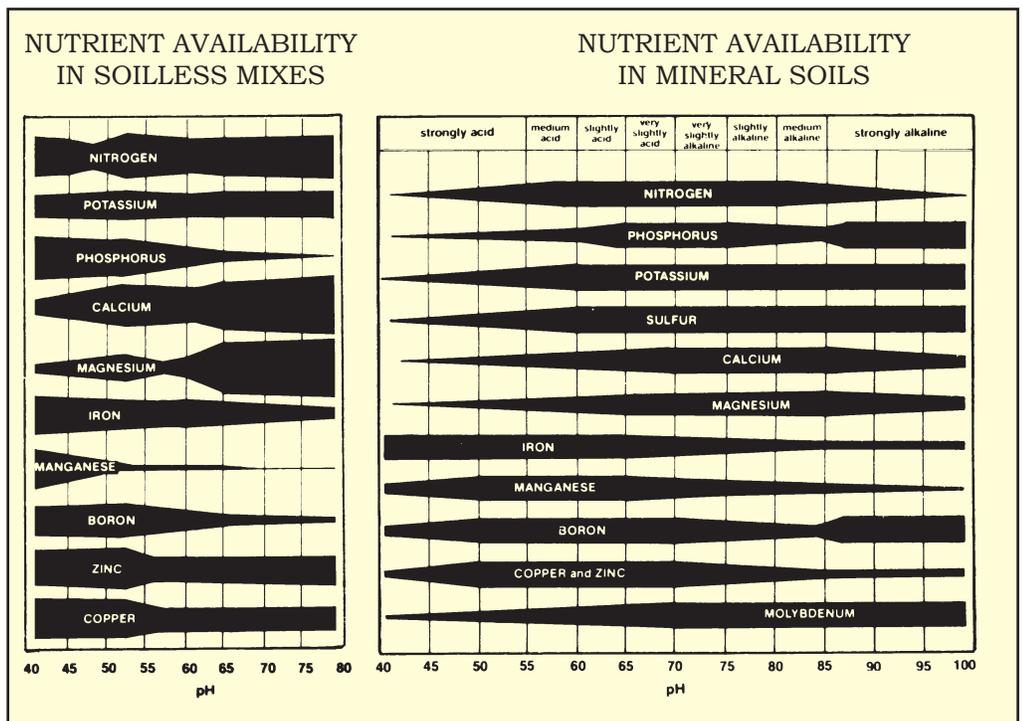
Fertilizers high in nitrogen from ammonium and urea sources generally have the highest potential acidity values. Formulas that contain nitrate salts of calcium, potassium, and sodium have low potential acidity values or even potential basicity ratings if they are used in combination with ammonium or urea fertilizers. Potential basicity is a measure of the liming potential of a non-acid-forming fertilizer formula.

Nutriculture® Formulas and Potential Acidity

Potential acidity or basicity becomes important when selecting a fertilizer for a crop that requires a particular pH. With **Nutriculture®**, you can choose from over 40 formulas for special conditions. With the right formula, you can maintain or correct for the required pH level at the same time you apply fertilizer. It's important for plants with special pH requirements such as azaleas that growers know the current pH of their growing medium before

selecting a fertilizer formula. If the acidity level is sufficient, **Nutriculture® Azalea Neutral** would provide the ideal diet while maintaining pH. However, if the medium is too basic (if the pH is too high), then we would recommend **Nutriculture® Hi-Acid** formula to feed and reduce pH in one convenient operation.

These charts are meant as a guide to show how pH levels affects the availability and release of fertilizer nutrients. All Nutriculture® formulations help to maintain a pH level of between 6.2 and 6.3 - allowing the greater availability of all nutrients.



Environmental Impact

Making success even more successful!

The use of Nutriculture (or any high quality liquid feed) in crop production or maintenance means that the grower is probably knowledgeable in very sophisticated ways of fertility control for his crops. He has probably learned that the old gunshot approach leaves a lot to chance. There is no single fertilizer that can be put down that will meet a crops needs at all the various stages of growth for any extended period. There can be periods of starvation as well as excess.

We all know what starvation can mean to a crop. What is not so apparent is what happens when there is excess. Beside actual crop damage, there can be unseen damage done to the surrounding environment. It is this environmental damage that is looming as a major threat to the entire growing industry.

Anyone who does the actual application of fertilizer (and other compounds), is the finale barrier to keeping our environment free of contaminants. This is true of almost all potential hazards. Educating the applicator in the proper handling and application is the key to protecting our environment. By their nature Nutriculture soluble fertilizers makes that job of education a little easier.

Nutriculture soluble fertilizers are Spoon-feeding fertilizers. As a totally water soluble nutrient mixture, Nutriculture is immediately available for uptake by the plant. This means, as todays more sophisticated grower knows, that a little goes a long way. Timely and precise placement become the keys to the best fertilizer practices. Best in terms of plant nutrition and for environmental concerns.

Problem Areas

Since Nutriculture when diluted is carried to the plant in water, it is apparent that water management is one of the keys to successful environmental management. But since it must be first mixed with water and then injected into the system, it might be best to focus first on the mix room.

Basically, moisture is the transport tool used to move the fertilizer and any other contaminants that the water may solubilize. This means that anywhere moisture can move, it can carry the fertilizer and other contaminants. This can be in very obvious areas such as runoff on slopes, streets curbs etc., as well as some not so apparent areas such as under ground and down public drains and sewers. In the mix room fertilizer should be stored in an area that is cool and dry. Open bags should be rolled tightly closed to prevent moisture and contamination. Floors should be of a non-permeable substance. Spills of the powdered fertilizer should be swept up and not allowed to lay around where it will actually pull

moisture from the air and liquefy itself.

The mix tank should be covered and have a back flow prevention device to protect the water supply.

The two primary areas for controlling water and fertilizer runoff is first in the application, and second in the capturing of any discharge or runoff and properly disposing of it or recycling and reuse.

The irrigation equipment should be designed for efficient precise placement of the water and nutrients. The old gunshot approach can apply here just as inappropriately as it did in other past practices. An overhead fertigation system watering and feeding a nursery filled with containerized pots can be putting 80% of the water and fertilizer between the pots. That is pouring money on the ground and creating contamination as well. Trickle, Drip, Mist or some form of Microirrigation would be better suited and would save precious water and fertilizer. The same methods would work well for some field grown crops and even orchards.

Greenhouse grown crops represent the most intensely cultivated crops grown anywhere. Every facet of their production has been manipulated to give the grower the edge over the unknown. This intensity makes it a natural next step after capturing any effluent that comes from production, to track and test it, then mix it with fresh water and recycle back through the system, adding any additional nutrients required. Testing and treating this effluent can be done in house or by outside sources.

With Nutriculture, good water management practices mean good fertilizer management.

There has been a lot of talk lately about Controlled Release Fertilizers (CRF) Vs. Liquid fertilizers (LF). This is reminiscent of the age old argument between Liquid Vs. Dry fertilizers. In our opinion the answer is still the same, they both have their place and each has its pluses and minuses.

Studies have shown that in certain growing conditions, the best crops come from a combination of CRF and LF. These conditions are generally in the less intensively cultivated crop areas, that is in nursery and field grown crops where natural environmental factors play a heavy and somewhat unpredictable role.

Costs can be another factor. Incorporating CRF into the soil mix is initially less expensive than investing in drip irrigation equipment. Once incorporated, there is a full seasons supply of CRF out there that is unstoppable. It will be released to the environment at a relatively predictable rate, and hopefully that rate will coincide with the crops needs. If not enough is released then the grower would probably have to apply additional fertilizer to keep growth on schedule. If too much is released, root damage could occur as well as loss through leaching.

There is a loss of nutritional control when using CRF because a full seasons requirements must be incorporated in the soil medium at time of planting and then subjected to release by sometimes uncontrollable environmental conditions.

Nutriculture is a Spoon-feeding fertilizer. It is applied only when the plants have a need and then in just enough quantity to meet that need. Since it is applied as the plants requirements demand, its nutrient ratios can also be adjusted if the plants requirements change.

No matter what method of fertilizer is used the grower should continuously monitor the crops progress through visual as well as occasional tissue analysis, pH checks, water analysis, and do leachate collection and testing.

Tank Mixing - mixing for direct application

Use this chart when mixing Nutriculture fertilizers in water for direct application. The amounts given are the amount of fertilizer in ounces required per gallon of water. Multiply this amount times the number of gallons the tank holds. Example: To use Nutriculture 12-31-14 in a 5 gallon sprayer at a desired rate of 350 Parts Per Million Nitrogen. Read across the chart at the 12% element to the 350 PPM column. It shows it will take 0.3889 ounces of fertilizer times 5 gallons which equals 1.9445 ounces or approximately 2 ounces.

% Fertilizer Element	Desired Feeding Rate In Parts Per Million									
	50	100	150	200	250	300	350	400	450	500
1	0.670	1.333	2.000	2.667	3.333	4.000	4.667	5.333	6.000	6.667
2	0.333	0.667	1.000	1.333	1.667	2.000	2.333	2.667	3.000	3.333
3	0.222	0.444	0.667	0.889	1.111	1.333	1.556	1.778	2.000	2.222
4	0.167	0.333	0.500	0.667	0.833	1.000	1.167	1.333	1.500	1.667
5	0.133	0.267	0.400	0.533	0.667	0.800	0.933	1.067	1.200	1.333
6	0.111	0.222	0.333	0.444	0.556	0.667	0.778	0.889	1.000	1.111
7	0.095	0.190	0.286	0.381	0.476	0.571	0.667	0.762	0.857	0.952
8	0.083	0.167	0.250	0.333	0.417	0.500	0.583	0.667	0.750	0.833
9	0.074	0.148	0.222	0.296	0.370	0.444	0.519	0.593	0.667	0.741
10	0.067	0.133	0.200	0.267	0.333	0.400	0.467	0.533	0.600	0.667
11	0.061	0.121	0.182	0.242	0.303	0.364	0.424	0.485	0.545	0.606
12	0.056	0.111	0.167	0.222	0.278	0.333	0.389	0.444	0.500	0.556
13	0.051	0.103	0.154	0.205	0.256	0.308	0.359	0.410	0.462	0.513
14	0.048	0.095	0.143	0.190	0.238	0.286	0.333	0.381	0.429	0.476
15	0.044	0.089	0.133	0.178	0.222	0.267	0.311	0.356	0.400	0.444
16	0.042	0.083	0.125	0.167	0.208	0.250	0.292	0.333	0.375	0.417
17	0.039	0.078	0.118	0.157	0.196	0.235	0.275	0.314	0.353	0.392
18	0.037	0.074	0.111	0.148	0.185	0.222	0.259	0.296	0.333	0.370
19	0.035	0.070	0.105	0.140	0.175	0.211	0.246	0.281	0.316	0.351
20	0.033	0.067	0.100	0.133	0.167	0.200	0.233	0.267	0.300	0.333
21	0.032	0.063	0.095	0.127	0.159	0.190	0.222	0.254	0.286	0.317
22	0.030	0.061	0.091	0.121	0.152	0.182	0.212	0.242	0.273	0.303
23	0.029	0.058	0.087	0.116	0.145	0.174	0.203	0.232	0.261	0.290
24	0.028	0.056	0.083	0.111	0.139	0.167	0.194	0.222	0.250	0.278
25	0.027	0.053	0.080	0.107	0.133	0.160	0.187	0.213	0.240	0.267
26	0.026	0.051	0.077	0.103	0.128	0.154	0.179	0.205	0.231	0.256
27	0.025	0.049	0.074	0.099	0.123	0.148	0.173	0.198	0.222	0.247
28	0.024	0.048	0.071	0.095	0.119	0.143	0.167	0.190	0.214	0.238
29	0.023	0.046	0.069	0.092	0.115	0.138	0.161	0.184	0.207	0.230
30	0.022	0.044	0.067	0.089	0.111	0.133	0.156	0.178	0.200	0.222
31	0.022	0.043	0.065	0.086	0.108	0.129	0.151	0.172	0.194	0.215
32	0.021	0.042	0.062	0.083	0.104	0.125	0.146	0.167	0.187	0.208
33	0.020	0.040	0.061	0.081	0.101	0.121	0.141	0.162	0.182	0.202
34	0.020	0.039	0.059	0.078	0.098	0.118	0.137	0.157	0.176	0.196
35	0.019	0.038	0.057	0.076	0.095	0.114	0.133	0.152	0.171	0.190
36	0.019	0.037	0.056	0.074	0.093	0.111	0.130	0.148	0.167	0.185
37	0.018	0.036	0.054	0.072	0.090	0.108	0.126	0.144	0.162	0.180
38	0.018	0.035	0.053	0.070	0.088	0.105	0.123	0.140	0.158	0.175

Feeding in PPM through a proportioner

Ounces of Fertilizer Required Per Gallon of Water to Achieve 100 PPM

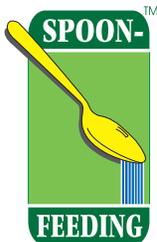
Select the percentage of fertilizer element in the left hand column and the ratio of the injector across the top of the chart. Where they meet is the amount of fertilizer required per gallon of concentrate solution to achieve **100 Parts Per Million**.

For other PPM concentrations multiply the required amount by desired PPM and divide by 100.

Example: To feed at 400 PPM Nitrogen using a proportioner set at a ratio of 1:100 and using a fertilizer with a Nitrogen content of 20%.

20% and 1:100 intersect at 6.66 ozs. The chart is at 100 PPM so $6.66 \times 400 / 100 = 26.64$ ozs.

If the tank feeding the proportioner holds 5 gals, multiply the 26.64 ozs by 5 to get the total fertilizer required.



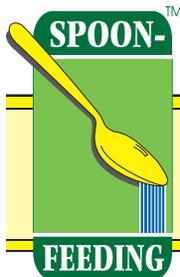
	1:15	1:50	1:100	1:150	1:200	1:250	1:300	1:350	1:400	1:500
3%	6.66	22.21	44.43	66.64	88.85	111.07	133.28	155.49	177.71	0.05
4%	5	16.66	33.32	49.98	66.64	83.3	99.96	116.62	133.28	0.07
5%	4	13.33	26.66	39.98	53.31	66.64	79.97	93.3	106.62	0.08
6%	3.33	11.11	22.21	33.32	44.43	55.53	66.64	77.75	88.85	0.1
7%	2.86	9.52	19.04	28.56	38.08	47.6	57.12	66.64	76.16	0.12
8%	2.5	8.33	16.66	24.99	33.32	41.65	49.98	58.31	66.64	0.13
9%	2.22	7.4	14.81	22.21	29.62	37.02	44.43	51.83	59.24	0.15
10%	2	6.66	13.33	19.99	26.66	33.32	39.98	46.65	53.31	0.17
11%	1.82	6.06	12.12	18.17	24.23	30.29	36.35	42.41	48.47	0.18
12%	1.67	5.55	11.11	16.66	22.21	27.77	33.32	38.87	44.43	0.2
13%	1.54	5.13	10.25	15.38	20.5	25.63	30.76	35.88	41.01	0.22
14%	1.43	4.76	9.52	14.28	19.04	23.8	28.56	33.32	38.08	0.23
15%	1.33	4.44	8.89	13.33	17.77	22.21	26.66	31.1	35.54	0.25
16%	1.25	4.17	8.33	12.5	16.66	20.83	24.99	29.16	33.32	0.27
17%	1.18	3.92	7.84	11.76	15.68	19.6	23.52	27.44	31.36	0.28
18%	1.11	3.7	7.4	11.11	14.81	18.51	22.21	25.92	29.62	0.3
19%	1.05	3.51	7.01	10.52	14.03	17.54	21.04	24.55	28.06	0.32
20%	1	3.33	6.66	10	13.33	16.66	19.99	23.32	26.66	0.33
21%	0.95	3.17	6.35	9.52	12.69	15.87	19.04	22.21	25.39	0.35
22%	0.91	3.03	6.06	9.09	12.12	15.15	18.17	21.2	24.23	0.37
23%	0.87	2.9	5.79	8.69	11.59	14.49	17.38	20.28	23.18	0.38
24%	0.83	2.78	5.55	8.33	11.11	13.88	16.66	19.44	22.21	0.4
25%	0.8	2.67	5.33	8	10.66	13.33	15.99	18.66	21.32	0.42
26%	0.77	2.56	5.13	7.69	10.25	12.82	15.38	17.94	20.5	0.43
27%	0.74	2.47	4.94	7.4	9.87	12.34	14.81	17.28	19.75	0.45
28%	0.71	2.38	4.76	7.14	9.52	11.9	14.28	16.66	19.04	0.47
29%	0.69	2.3	4.6	6.89	9.19	11.49	13.79	16.09	18.38	0.48
30%	0.67	2.22	4.44	6.66	8.89	11.11	13.33	15.55	17.77	0.5

Grams of Fertilizer Required Per Litre of Water to Achieve 100 PPM

	1:15	1:50	1:100	1:150	1:200	1:250	1:300	1:350	1:400	1:500
3%	50	167	333	500	667	833	1000	1167	1333	1667
4%	37.5	125	250	375	500	625	750	875	1000	1250
5%	30	100	200	300	400	500	600	700	800	1000
6%	25	83	167	250	333	417	500	583	667	833
7%	21.43	71	143	214	286	357	429	500	571	714
8%	18.75	63	125	188	250	313	375	438	500	625
9%	16.67	56	111	167	222	278	333	389	444	556
10%	15	50	100	150	200	250	300	350	400	500
11%	13.64	45	91	136	182	227	273	318	364	455
12%	12.5	42	83	125	167	208	250	292	333	417
13%	11.54	38	77	115	154	192	231	269	308	385
14%	10.71	36	71	107	143	179	214	250	286	357
15%	10	33	67	100	133	167	200	233	267	333
16%	9.38	31	63	94	125	156	188	219	250	313
17%	8.82	29	59	88	118	147	176	206	235	294
18%	8.33	28	56	83	111	139	167	194	222	278
19%	7.89	26	53	79	105	132	158	184	211	263
20%	7.5	25	50	75	100	125	150	175	200	250
21%	7.14	24	48	71	95	119	143	167	190	238
22%	6.82	23	45	68	91	114	136	159	182	227
23%	6.52	22	43	65	87	109	130	152	174	217
24%	6.25	21	42	63	83	104	125	146	167	208
25%	6	20	40	60	80	100	120	140	160	200
26%	5.77	19	38	58	77	96	115	135	154	192
27%	5.56	19	37	56	74	93	111	130	148	185
28%	5.36	18	36	54	71	89	107	125	143	179
29%	5.17	17	34	52	69	86	103	121	138	172
30%	5	17	33	50	67	83	100	117	133	167

Formulations

The following formulas are representative of some of our more popular blends. These are readily available but are by no means the only formulas we offer. The grower should contact his sales representative for special requests that he might find more appropriate for his crops nutritional needs.



Cyclamen Finisher 11-8-27 PLUS

• **Three forms of iron to work in wide pH range**

• **NPK with calcium, magnesium and a unique blend of minors**

A unique blend of major secondary and minor elements designed to bring this crop to maturity and maintain its vigor. Iron is provided with three forms of chelation to ensure availability in a broad range of water and soil conditions. This is a labor saving formula that

eliminates separate injection of multiple chemicals. Calcium and magnesium are provided along with phosphorus in one mix that is totally soluble for a single injector feed that's easy and convenient.

Guaranteed Analysis (For continuous liquid feeding)

11-8-27+	Percent	Lbs/Ton	Concentration at
Total Nitrogen (N)	11%	220	200 PPM as N
0.06% Ammoniacal Nitrogen			
10.94% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	8%	160	145 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	27%	540	490 PPM as K ₂ O
Calcium (Ca)	5%	100	92 PPM as Ca
Magnesium (Mg)	0.85%	17	15 PPM as Mg
Boron (B)	0.03%	0.6	0.57 PPM as B
Iron (Fe)	0.11%	2.2	2.05 PPM as Fe
0.11% Chelated Iron (Fe)			
Manganese (Mn)	0.016%	.32	.3 PPM as MN
0.016% Chelated Manganese (Mn)			
Zinc (Zn)	0.009%	.18	.17 PPM as Zn
0.009% Chelated Zinc (Zn)			

Derived from Potassium Phosphate, Potassium Nitrate, Calcium Nitrate, Magnesium Nitrate, Boron, Iron EDTA, EDDHA, DTPA, Manganese EDTA and Zinc EDTA. Potential basicity equivalent to 331 lbs. Calcium Carbonate per ton.

MIXING RATE FOR 200 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio - Premix 3.63 oz. per gallon (27 grams per liter).

TANK: 0.24 oz. per gallon (1.82 grams per liter).

PROPORTIONER: 1:100 ratio - use 24.23 oz. per gal. of concentrate (182 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.

OTHER PPM: Multiply desired PPM times weight divided by 200. Increase or decrease PPM according to crop response.

NITROGEN PARTS PER MILLION CHART

Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	.91	1.82	2.73	3.63	5.45	7.27
1:50	3.03	6.06	9.09	12.12	18.17	24.23
1:100	6.06	12.12	18.17	24.23	36.35	48.47
1:200	12.12	24.23	36.35	48.47	*	*
1:300	18.17	36.35	54.52	*	*	*

EC (+ - 10%) mmhos/cm.40 .81 1.21 1.62 2.43 3.24

*Maximum solubility approx. 60 oz. per gallon

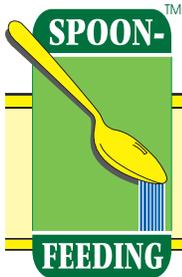
To Order Use Code:

25 lb Bag:

110827+

Bulk Bag:

M110827+



Plug Special 12-2-12 PLUS

With Iron EDTA and Iron EDDHA

- **Delivers sufficient micronutrients at low PPM-N.**
- **Formulated for propagation.**
- **Sophisticated chelation devices ensure micronutrient uptake and utilization.**

12-2-12 was developed to meet the nutrient ratios desired during propagation. The high-nitrate, low-phosphorus blend will produce a compact, toned plant with very small internodes between leaf breaks. The high calcium and magnesium levels in a 2:1 ratio will build a solid root mass with

healthy and strong chloroplasts. The micronutrients have been adjusted to meet the needs of the plant at low ppm-nitrogen (N) levels. This fertilizer will deliver 1 ppm iron (Fe) at a 100 ppm nitrogen feed rate. While this product was created for low ppm-nitrogen, use caution at elevated feed rates where micronutrient levels rise expediently.

For Continuous Liquid Feeding
GUARANTEED ANALYSIS

12-2-12+	Percent	Lbs/Ton	Concentration at 100 PPM as N
Total Nitrogen (N)	12%	240	100 PPM as N
0.57% Ammoniacal Nitrogen			
11.43% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	2%	40	16.7 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	12%	240	100 PPM as K ₂ O
Calcium (Ca)	6.3%	126.5	52.5 PPM as Ca
Magnesium (Mg)	3.1%	63.2	25.8 PPM as Mg
3.1% Water Soluble Magnesium (Mg)			
Boron (B)	0.02%	0.4	0.17 PPM as B
Copper (Cu)	0.05%	1	0.42 PPM as Cu
0.05% Chelated Copper (Cu)			
Iron (Fe)	0.12%	2.4	1.0 PPM as Fe
0.12% Chelated Iron (Fe)			
Manganese (Mn)	0.06%	1.2	0.5 PPM as Mn
0.06% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.015%	2.06	0.86 PPM as Mo
Zinc (Zn)	0.05%	1.06	0.44 PPM as Zn
0.05% Chelated Zinc (Zn)			

Derived from Ammonium Nitrate, Potassium Nitrate, Monopotassium Phosphate, Magnesium Nitrate, Calcium Nitrate, Borax, Sodium Molybdate, Copper EDTA, Iron EDTA, Iron EDDHA, Manganese EDTA, and Zinc EDTA. Potential basicity equivalent to 237 lbs. Calcium Carbonate per ton.

CAUTION: This product is to be used on crops which respond to molybdenum. Crops high in molybdenum are toxic to grazing animals.

Information regarding the contents and levels of metals in this product is available on the internet at <http://www.aapfco.org/metals.htm>

MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio- Premix 1.67 oz. in 1 gallon (12.5 grams per liter).

TANK: 0.11 oz. per gallon (0.83 grams per liter).

PROPORTIONER: 1:100 ratio use 11.11 oz. per gal. of concentrate (167 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.

OTHER PPM: Multiply desired PPM times weight divided by 100. Increase or decrease PPM according to response.

MIXING RATE FOR VARIOUS PPM NITROGEN

Parts Per Million	50	100	150	200	300	400
Ounces of Fertilizer Required per Gallon of Concentrate						
1:15	0.83	1.67	2.50	3.33	5.00	6.66
1:50	2.78	5.55	8.33	11.11	16.66	22.21
1:100	5.55	11.11	16.66	22.21	33.32	44.43
1:200	11.11	22.21	33.32	44.43	*	*
1:300	16.66	33.32	49.98	*	*	*

EC (+/- 10%) mmhos/cm 0.37 0.75 1.12 1.50 2.25 3.00

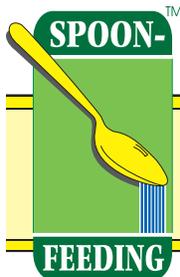
*Maximum solubility approx. 3 lbs 12 ozs. per gallon.

To Order Use Code:

25 lb Bag:

120212+





Cyclamen Early Feed 12-7-19 PLUS

- **Three forms of Iron to work in wide pH range**
- **NPK with calcium, magnesium and a unique blend of minors**

This analysis is designed to push toned vegetative growth in the early stages of cyclamen cultivation. The high potash will promote sturdy stems and the calcium will encourage expanded leaf surface. A unique

blend of secondary and minor elements including iron which is provided with three forms of chelation, will enable a broad range of media pH which is conducive to proper potassium, calcium and magnesium uptake. This is a labor saving formula that eliminates separate injection of multiple chemicals. Calcium and magnesium are provided along with phosphorus in one mix that's totally soluble for a single injector feed that's easy and convenient.

Guaranteed Analysis 12-7-19+ at	(For continuous liquid feeding)		
	Percent	Lbs/Ton	Concentration
Total Nitrogen (N)	12%	240	200 PPM as N
4.67% Ammoniacal Nitrogen			
5.33% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	7%	140	116 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	19%	380	316 PPM as K ₂ O
Calcium (Ca)	7.8%	157	131 PPM as Ca
Magnesium (Mg)	0.97%	19.5	16.3 PPM as Mg
Boron (B)	0.03%	0.6	0.51 PPM as B
Iron (Fe)	0.11%	2.2	2.05 PPM as Fe
0.11% Chelated Iron (Fe)			
Manganese (Mn)	0.016%	.32	.02 PPM as MN
0.016% Water Soluble Manganese (Mn)			
Zinc (Zn)	0.009%	.018	.15 PPM as Zn
0.009% Water Soluble Zinc (Zn)			

Derived from Ammonium Nitrate, Potassium Phosphate, Potassium Nitrate, Calcium Nitrate, Magnesium Nitrate, Boron, Iron EDTA, EDDHA and DTPA, Manganese Sulfate and Zinc Sulfate. Potential basicity equivalent to 280 lbs. Calcium Carbonate per ton.

MIXING RATE FOR 200 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio - Premix 3.63 oz. per gallon (27 grams per liter).

TANK: 0.24 oz. per gallon (1.82 grams per liter).

PROPORTIONER:

1:100 ratio - use 24.23 oz. per gal. of concentrate (182 grams per liter).

OTHER RATIOS:

Multiply ratio times weight divided by 100.

OTHER PPM:

Multiply desired PPM times weight divided by 200. Increase or decrease PPM according to crop response.

NITROGEN PARTS PER MILLION CHART

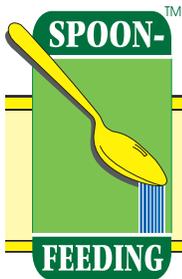
Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	.83	1.67	2.5	3.33	5.0	6.66
1:50	2.78	5.55	8.33	11.11	16.66	22.21
1:100	5.55	11.11	16.66	22.21	33.32	44.43
1:200	11.11	22.21	33.32	44.43	*	*
1:300	16.66	33.32	49.98	*	*	*

EC (+ - 10%) mmhos/cm

*Maximum solubility approx. 60 oz. per gallon

To Order Use Code:

25 lb Bag: 120719+



Super Start 12-45-10 PLUS

- Establishes seeds and seedlings fast
- Develops strong roots

Super Start 12-45-10^{PLUS} is especially designed as a starter solution which aids plants in rooting faster. It helps overcome transplanting shock. Its nitrogen content is low enough to prevent burning and still promote new top growth. Super Start is widely

used in greenhouse and nursery operations to correct and supplement low phosphorous levels in established plantings. It is also very effective in promoting blossoming. Young vegetable plants being set in the field respond especially well to this starter formula. Use for seedling, transplants and rooted cuttings. Excellent for container azaleas and rhododendrons to promote compact growth and increase bud density.

Guaranteed Analysis (For continuous liquid feeding)

12-45-10+	Percent	Lbs/Ton	Concentration at
Total Nitrogen (N)	12%	240	200 PPM as N
9.11% Ammoniacal Nitrogen			
2.89% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	45%	900	750 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	10%	200	167 PPM as K ₂ O
Magnesium	0.05%	1.0	0.83 PPM as Mg
Sulfur (S)	0.31%	6.2	5.2 PPM as S
0.31% Combined Sulfur (S)			
Boron (B)	0.02%	0.4	0.33 PPM as B
Copper (Cu)	0.05%	1.0	0.83 PPM as Cu
0.05% Chelated Copper (Cu)			
Iron (Fe)	0.10%	2.0	1.67 PPM as Fe
0.10% Chelated Iron (Fe)			
Manganese (Mn)	0.05%	1.0	0.83 PPM as Mn
0.05% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.001%	0.02	0.0167 PPM as Mo
Zinc (Zn)	0.05%	1.0	0.83 PPM as Zn
0.05% Chelated Zinc (Zn)			

Derived from Ammonium Sulfate, Ammonium Phosphate, Potassium Nitrate, Magnesium Sulfate, Borax, Sodium Molybdate, and the EDTA forms of Copper, Iron, Manganese and Zinc. CAUTION: This fertilizer is to be used on soils which responds to molybdenum. Crops high in molybdenum are toxic to grazing animals. Potential acidity equivalent to 737 lbs. Calcium Carbonate per ton.

GREENHOUSE MIXING RATE FOR 200 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio- Premix 3.33 oz. in 1 gallon (25 grams per liter).

TANK: 0.22 oz. per gallon (1.67 grams per liter).

PROPORTIONER: 1:100 ratio use 22.21 oz. per gal. of concentrate (167 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.

OTHER PPM: Multiply desired PPM times weight divided by 200. Increase or decrease PPM according to crop response.

NITROGEN PARTS PER MILLION CHART

Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	.83	1.67	2.50	3.33	5.00	6.66
1:50	2.78	5.55	8.33	11.11	16.66	22.21
1:100	5.55	11.11	16.66	22.21	33.30	44.43
1:200	11.11	22.21	33.32	44.43	*	*
1:300	16.66	33.32	49.98	*	*	*

EC (+ - 10%) mmhos/cm.36 .71 1.07 1.42 2.13 2.84

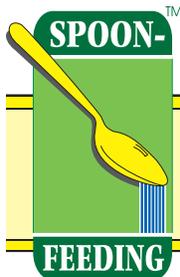
*Maximum solubility approx. 60 oz. per gallon

Available in standard 25 lb bag and 5 lb bags packed 6 per case.

To Order Use Code:

25 lb Bag: 124510+

Case of 6X5 lb: PM5124510



Hi-K Special 13-0-44 PLUS

- Establishes seeds and seedlings fast
- Develops strong roots

Hi-K Special 13-0-44^{PLUS} is all nitrate nitrogen and is an excellent crop toner for any plant variety, especially during periods of low light. Application can be made as early as half way through the total crop time and continued until

finished. Being high in potash, it is an excellent late season fertilizer that will help to toughen up nursery stock, trees, shrubs, turf and greens to make them more resistant to frost, snow and ice. As the growing season comes to an end more frequent applications of the 13-0-44 should be made. It is excellent for overcoming severe potash deficiencies, or applications can be altered with other Nutriculture formulas to prevent a marginal low potash condition.

Guaranteed Analysis (For continuous liquid feeding)

13-0-44+	Percent Lbs/Ton Concentration at		
Total Nitrogen (N)	13%	272	200 PPM as N
13% Nitrate Nitrogen			
Soluble Potash (K ₂ O)	44%	880	647 as K ₂ O
Boron (B)	0.02%	0.40	0.29 PPM as B
Copper (Cu)	0.05%	1.00	0.74 PPM as Cu
0.05% Chelated Copper (Cu)			
Iron (Fe)	0.10%	2.00	1.47 PPM as Fe
0.10% Chelated Iron (Fe)			
Manganese (Mn)	0.05%	1.00	0.74 PPM as Mn
0.05% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.0009%	0.018	0.01 PPM as Mo
Zinc (Zn)	0.05%	1.00	0.74 PPM as Zn
0.05% Chelated Zinc (Zn)			

Derived from Potassium Nitrate, Borax, Copper EDTA, Iron EDTA, Manganese EDTA and Zinc EDTA. CAUTION: This fertilizer is to be used on soils which respond to molybdenum. Crops high in molybdenum are toxic to grazing animals. Potential basicity equivalent to 450 lbs. Calcium Carbonate per ton.

MIXING RATE FOR 200 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio-Premix

3.08 oz. per gal. (23.08 gms. per liter)

TANK: 0.21 oz. per gal. (1.54 gms. per liter)

PROPORTIONER: 1:100 ratio use 20.5 oz. per gal. of concentrate. (154 gms. per liter).

OTHER RATIOS: Multiply ratio times ounces divided by 100.

OTHER PPM: Multiply desired PPM times ounces divided by 200.

Increase or decrease PPM according to crop response.

NITROGEN PARTS PER MILLION CHART

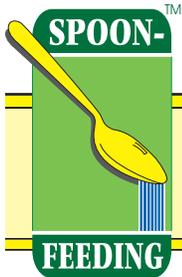
Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	.77	1.54	2.31	3.08	4.61	6.15
1:50	2.56	5.13	7.69	10.25	15.40	20.50
1:100	5.13	10.25	15.38	20.50	30.80	41.01
1:200	10.25	20.50	30.76	41.01	61.5	*
1:300	15.38	30.76	46.14	61.51	*	*

EC (+ - 10%) mmhos/cm.48 .95 1.41 1.88 2.83 3.77

*Maximum solubility approx. 60 oz. per gallon

To Order Use Code:

25 lb Bag: 130044+



Plug Special 13-2-13 PLUS

With 6% Calcium & 3% Magnesium

- **Formulated especially for plug production**
- **Develops strong roots and vibrant seedlings**

If the proper nutrients are not available to the plant in the first few days of growth, a plant will not obtain its full growth potential. Plug Special 13-2-13^{PLUS} is designed to do just that. It is a formula with high nitrate nitrogen, calcium, magnesium, and minor

elements, mostly derived from the chelated (EDTA) form, and all combined into a totally soluble mix. The trace elements are delicately balanced at levels that have proven to perform well. This 13-2-13 formulation contains 2% P₂O₅ in combination with calcium yet this formula will maintain its solubility over a broad pH range. Although designed for plug growing, this formula will work equally well on any crop that may be sensitive to ammoniacal nitrogen during low light periods.

For Continuous Liquid Feeding
GUARANTEED ANALYSIS

13-2-13+	Percent	Lbs/Ton	Concentration at
Total Nitrogen (N)	13%	260	200 PPM as N
0.80% Ammoniacal Nitrogen			
12.2% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	2%	40	31 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	13%	260	200 PPM as K ₂ O
Calcium (Ca)	6%	120	92 PPM as Ca
Magnesium (Mg)	3%	60	46 PPM as Mg
3% Water Soluble Magnesium (Mg)			
Boron (B)	0.0017%	0.03	0.02 PPM as B
Copper (Cu)	0.03%	0.60	0.46 PPM as Cu
0.03% Chelated Copper (Cu)			
Iron (Fe)	0.05%	1.0	0.77 PPM as Fe
0.05% Chelated Iron (Fe)			
Manganese (Mn)	0.03%	0.60	0.46 PPM as Mn
0.03% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.0075%	0.15	0.12 PPM as Mo
Zinc (Zn)	0.028%	0.56	0.43 PPM as Zn
0.028% Chelated Zinc (Zn)			

Derived from Ammonium Nitrate, Potassium Nitrate, Monopotassium Phosphate, Magnesium Nitrate, Calcium Nitrate, Borax, Sodium Molybdate, Copper EDTA, Iron EDTA, Manganese EDTA, and Zinc EDTA. Potential basicity equivalent to 221 lbs. Calcium Carbonate per ton.

CAUTION: This product is to be used on crops which respond to molybdenum. Crops high in molybdenum are toxic to grazing animals.

Information regarding the contents and levels of metals in this product is available on the internet at <http://www.aapfco.org/metals.htm>

GREENHOUSE MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio-Premix 1.54 oz. in 1 gallon (11.54 grams per liter).

TANK: 0.10 oz. per gallon (0.77 grams per liter). PROPORTIONER: 1:100 ratio use 10.25 oz. per gal. of concentrate (77 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.

OTHER PPM: Multiply desired PPM times weight divided by 100. Increase or decrease PPM according to crop response.

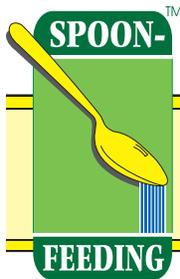
MIXING RATE FOR VARIOUS PPM NITROGEN

Parts Per Million		50	100	150	200	300	400
Ounces of Fertilizer Required per Gallon of Concentrate							
Injector Ratios	1:15	0.77	1.54	2.31	3.08	4.61	6.15
	1:50	2.56	5.13	7.69	10.25	15.38	20.50
	1:100	5.13	10.25	15.38	20.50	30.76	41.01
	1:200	10.25	20.50	30.76	41.01	*	*
	1:300	15.38	30.76	46.14	*	*	*
EC (+/- 10%) mmhos/cm		0.37	0.75	1.12	1.50	2.25	3.00

*Maximum solubility approx. 3 lbs 12 ozs. per gallon.

To Order Use Code:
25 lb Bag: 130213+





Cal-Mag Special 14-3-20 PLUS

With 4% Calcium and 2% Magnesium

- **High nitrate nitrogen**
- **Stiffen stems**
- **Deeper color**

Cal-Mag Special is a non acidifying ready source of available calcium and magnesium in a totally soluble form that is immediately available to the plant. Cal-Mag Special has most of its nitrogen in the nitrate form making it ideal as

a dark weather feed where the conversion of nitrogen to the nitrate form in the soil media could be a problem. This formula was designed to meet the nutritional needs of a variety of crops. Potash has been elevated to promote bract size and color. It will also produce sturdier stems that will help reduce breakage when slewing. High calcium will push leaf expansion, prevent interveinal chlorosis and improve photosynthesis. Molybdenum has been elevated to meet the demands of a poinsettia crop in converting this high nitrate based fertilizer into an amine within the plant. Iron has also been increased to allow production at a media pH range of 6.5 to 6.7.

Guaranteed Analysis (For continuous liquid feeding)			
14-3-20+	Percent	Lbs/Ton	Concentration
Total Nitrogen	14%	300	200 PPM as N
1.72% Ammoniacal N			
12.28% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	3%	60	43 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	20%	400	285 PPM as K ₂ O
Calcium (Ca)	4.0%	80	57 PPM as Ca
Magnesium (Mg)	2.0%	40	29 PPM as Mg
Boron (B)	0.02%	0.4	0.29 PPM as B
Copper (Cu)	0.03%	0.6	0.43 PPM as Cu
0.03% Chelated Copper (Cu)			
Iron (Fe)	0.10%	2	1.5 PPM as Fe
0.10% Chelated Iron (Fe)			
Manganese (Mn)	0.03%	0.6	0.43 PPM as Mn
0.03% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.0006%	0.012	0.01 PPM as Mo
Zinc (Zn)	0.025%	0.5	0.36 PPM as Zn
0.025% Chelated Zinc (Zn)			

Derived from Ammonium Nitrate, Ammonium Phosphate, Calcium Nitrate, Potassium Nitrate, Magnesium Nitrate, Borax, Sodium Molybdate, and the EDTA form of Copper, Iron, Manganese and Zinc. Potential basicity equivalent to 176 lbs. Calcium Carbonate per ton.

This material dissolves completely in tap water or well water. It will dissolve almost instantly in hot water. Its ability to stay in solution without precipitation makes it ideal for applying by tank, spray rig, or through all injector systems and even the finest misting nozzles.

NITROGEN PARTS PER MILLION CHART

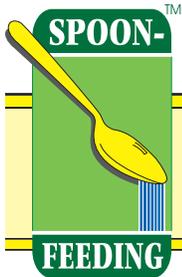
Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	.71	1.43	2.14	2.86	4.28	5.71
1:50	2.38	4.76	7.14	9.52	14.28	19.04
1:100	4.76	9.52	14.28	19.04	28.56	38.08
1:200	9.52	19.04	28.56	38.08	57.12	*
1:300	14.28	28.56	42.84	57.12	*	*

EC (+ - 10%) mmhos/cm .35 .71 1.06 1.42 2.12 2.83

*Maximum solubility approx. 3 lbs 8 ozs. per gallon

To Order Use Code:

25 lb Bag: 140320+



Hi-Cal Special 15-0-15 PLUS with 10.5% Calcium

- **Increased molybdenum**
- **High nitrate nitrogen**

Hi-Cal Special 15-0-15^{PLUS} is a plug growing formula with high nitrate nitrogen, calcium, magnesium, and minor elements, all combined into a totally soluble mix. The trace elements are

delicately balanced at levels that have proven to perform well. This formula will work well when phosphate is not a problem or is being supplied separately. Although designed for plug growing, this formula will work equally well on any crop that may be sensitive to ammoniacal nitrogen during low light periods.

Guaranteed Analysis (For continuous liquid feeding)			
15-0-15+	Percent	Lbs/Ton	Concentration
Total Nitrogen (N)	15%	300	200 PPM as N
13% Nitrate Nitrogen			
2% Urea Nitrogen			
Soluble Potash (K ₂ O)	15%	300	200 PPM as K ₂ O
Calcium (Ca)	10.50%	210	140 PPM as Ca
Magnesium (Mg)	0.3%	0.6	5.07 PPM as Mg
Sulfur (S)	0.12%	2.4	1.6 PPM as S
Boron (B)	0.02%	0.40	0.27 PPM as B
Copper (Cu)	0.05%	1.0	0.67 PPM as Cu
0.05% Chelated Copper (Cu)			
Iron (Fe)	0.10%	2.0	1.33 PPM as Fe
0.10% Chelated Iron (Fe)			
Manganese (Mn)	0.05%	1.0	0.67 PPM as Mn
0.05% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.0009%	0.02	0.01 PPM as Mo
Zinc (Zn)	0.05%	1.0	0.67 PPM as Zn
0.05% Chelated Zinc (Zn)			

Derived from Potassium Nitrate, Calcium Nitrate, Magnesium Sulfate, Urea, Borax, Sodium Molybdate and the EDTA form of Copper, Iron, Manganese and Zinc. CAUTION: This fertilizer is to be used on soils which responds to molybdenum. Crops high in molybdenum are toxic to grazing animals. Potential basicity equivalent to 319 lbs. Calcium Carbonate per ton.

Test nutrient levels in both water and growing media prior to use. Suggested use on a constant feed basis is at 100 PPM nitrogen or on an intermittent feed basis 200 PPM nitrogen. Use growth results and nutritional monitoring to adjust this rate.

MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio-Premix 1.33 oz. in 1 gallon (10 grams per liter).
 TANK: 0.09 oz. per gallon (0.67 grams per liter).
 PROPORTIONER: 1:100 ratio use 8.89 oz. per gal. of concentrate (67 grams per liter).
 OTHER RATIOS: Multiply ratio times weight divided by 100.
 OTHER PPM: Multiply desired PPM times weight divided by 100. Increase or decrease PPM according to crop response.

NITROGEN PARTS PER MILLION CHART

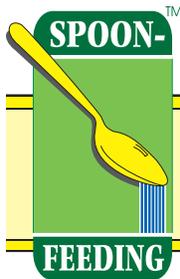
Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	.67	1.33	2.00	2.67	4.00	5.33
1:50	2.22	4.44	6.66	8.89	13.30	17.77
1:100	4.44	8.89	13.33	17.77	26.7	35.54
1:200	8.89	17.77	26.66	35.54	53.30	*
1:300	13.33	26.66	39.98	53.31	*	*

EC (+ - 10%) mmhos/cm .34 .69 1.03 1.38 2.06 2.75

*Maximum solubility approx. 3 lbs 8 ozs. per gallon

Available in standard 25 lb bag
To Order Use Code:
 25 lb Bag: 150015+





Nutriculture®

Cal-Mag Special 15-3-18 PLUS

With 6% Calcium & 1% Magnesium

- **High nitrate N with Ca, Mg and P**

Cal-Mag Special 15-3-18^{PLUS} contains calcium, magnesium and a very high ratio of nitrogen in the preferred nitrate

- **Stiffen Stems**

form. The nitrate will produce good, hard growth, while the phosphorous levels will keep growth short and compact between leaf nodes. The stepped-up amount of potash will ensure good and healthy cell wall development.

Guaranteed Analysis (For continuous liquid feeding)			
15-3-18+	Percent	Lbs/Ton	Concentration
Total Nitrogen (N)	15%	300	200 PPM as N
2.35% Ammoniacal Nitrogen			
12.65% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	3.0%	60	40 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	18%	360	240 PPM as K ₂ O
Calcium (Ca)	6.0%	120	80 PPM as Ca
Magnesium (Mg)	1.0%	20	13 PPM as Mg
1.0% Water Soluble Magnesium (Mg)			
Boron (B)	0.02%	0.40	0.27 PPM as B
Copper (Cu)	0.03%	0.6	0.4 PPM as Cu
0.03% Chelated Copper (Cu)			
Iron (Fe)	0.05%	1.0	0.69 PPM as Fe
0.05% Chelated Iron (Fe)			
Manganese (Mn)	0.03%	0.6	0.4 PPM as Mn
0.03% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.0027%	0.054	0.04 PPM as Mo
Zinc (Zn)	0.02%	0.40	0.27 PPM as Zn
0.02% Chelated Zinc (Zn)			

Derived from Ammonium Nitrate, Ammonium Phosphate, Potassium Nitrate, Calcium Nitrate, Magnesium Nitrate, Borax, Sodium Molybdate and the EDTA form of Copper, Iron, Manganese and Zinc. CAUTION: This fertilizer is to be used on soils which responds to molybdenum. Crops high in molybdenum are toxic to grazing animals. Potential basicity equivalent to 155 lbs. Calcium Carbonate per ton.

MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio- Premix 1.33 oz. in 1 gallon (10 grams per liter).

TANK: 0.09 oz. per gallon (0.67 grams per liter).

PROPORTIONER: 1:100 ratio use 8.89 oz. per gal. of concentrate (67 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.

OTHER PPM: Multiply desired PPM times weight divided by 100. Increase or decrease PPM according to crop response.

NITROGEN PARTS PER MILLION CHART

Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	.67	1.33	2.00	2.67	4.00	5.33
1:50	2.22	4.44	6.66	8.89	13.30	17.77
1:100	4.44	8.89	13.33	17.77	26.7	35.54
1:200	8.89	17.77	26.66	35.54	53.30	*
1:300	13.33	26.66	39.98	53.31	*	*

EC (+ - 10%) mmhos/cm .35 .71 1.06 1.42 2.12 2.83

*Maximum solubility approx. 3 lbs 8 ozs. per gallon

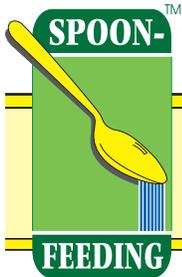
Available in standard 25 lb bag and 5 lb bags packed 6 per case.

To Order Use Code:

25 lb Bag: 150318+

Case of 6X5lb: PM5150318

 **Plant Marvel** Laboratories, Inc.
371 East 16th Street
Chicago Heights, IL 60411
www.plantmarvel.com
Fax 708-757-5224
Phone 800-524-7031



Nutriculture®

Pansy Special 15-3-20 PLUS

With 3.75% Calcium & 1% Magnesium

- Provides increased Mo with Ca and Mg
- Stiffen stems

Pansy Special 15-3-20^{PLUS} contains calcium, magnesium and a very high ratio of nitrogen in the preferred nitrate form. The nitrate will produce good, hard growth, while the phosphorous levels will keep

the pansies short and compact. The stepped-up amount of potash will ensure good and healthy cell wall development.

MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio- Premix 1.33 oz. in 1 gallon (10 grams per liter).

TANK: 0.09 oz. per gallon (0.67 grams per liter).

PROPORTIONER: 1:100 ratio use 8.89 oz. per gal. of concentrate (67 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.

OTHER PPM: Multiply desired PPM times weight divided by 100. Increase or decrease PPM according to crop response.

Guaranteed Analysis (For continuous liquid feeding)

15-3-20+	Percent	Lbs/Ton	Concentration
Total Nitrogen (N)	15%	300	200 PPM as N
2.09% Ammoniacal Nitrogen			
12.91% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	3.0%	60	40 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	20%	400	267 PPM as K ₂ O
Calcium (Ca)	3.75%	75	47 PPM as Ca
Magnesium (Mg)	1.0%	20	13 PPM as Mg
1.0% Water Soluble Magnesium (Mg)			
Boron (B)	0.03%	0.60	0.40 PPM as B
Copper (Cu)	0.01%	0.2	0.13 PPM as Cu
0.01% Chelated Copper (Cu)			
Iron (Fe)	0.10%	2.0	1.33 PPM as Fe
0.10% Chelated Iron (Fe)			
Manganese (Mn)	0.05%	1.0	0.67 PPM as Mn
0.05% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.0079%	0.158	0.105 PPM as Mo
Zinc (Zn)	0.02%	0.40	0.27 PPM as Zn
0.02% Chelated Zinc (Zn)			

Derived from Ammonium Nitrate, Ammonium Phosphate, Potassium Nitrate, Calcium Nitrate, Magnesium Nitrate, Borax, Sodium Molybdate and the EDTA form of Copper, Iron, Manganese and Zinc. CAUTION: This fertilizer is to be used on soils which respond to molybdenum. Crops high in molybdenum are toxic to grazing animals. Potential basicity equivalent to 40 lbs. Calcium Carbonate per ton.

NITROGEN PARTS PER MILLION CHART

Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	.67	1.33	2.00	2.67	4.00	5.33
1:50	2.23	4.45	6.67	8.89	13.34	17.78
1:100	4.45	8.89	13.34	17.78	26.67	35.56
1:200	8.90	17.78	26.68	35.56	53.34	*
1:300	13.35	26.67	40.02	53.34	*	*

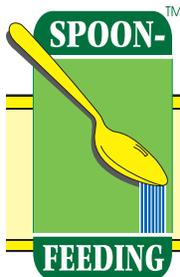
EC (+ - 10%) mmhos/cm .35 .70 1.05 1.40 2.10 2.80

*Maximum solubility approx. 3 lbs 8 ozs. per gallon

To Order Use Code:

25 lb Bag: 150320+P

 **Laboratories, Inc.**
 371 East 16 th Street
 Chicago Heights, IL 60411
 www.plantmarvel.com
 Fax 708-757-5224
 Phone 800-524-7031



Nutriculture®

Bedding Plant Cal-Mag Special 15-3-20 PLUS

With 3.75% Calcium & 1.12% Magnesium

- Provides NPK, Ca, Mg, with minor elements
- Increased Iron in two chelated forms

This high nitrate blend was designed specifically for bedding plants. The K to N ratio will promote short, compact, and toned plants. Some critical micro nutrient levels have been elevated to provide sufficient

results with minimal nitrogen levels at hose end. This Bedding Plant Cal Mag Special 15-3-20^{PLUS} contains calcium and magnesium with increased Iron in two different forms of chelation to increase its effectiveness through a broader pH range. The stepped-up amount of potash will also insure good healthy cell wall development which should get bedding plants off to a good start. Caution: Some micro nutrient levels may be in excess at heavier feed rates.

Guaranteed Analysis (For continuous liquid feeding)

15-3-20+	Percent	Lbs/Ton	Concentration
Total Nitrogen (N)	15%	300	200 PPM as N
2.09% Ammoniacal Nitrogen			
12.91% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	3.0%	60	37.5 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	20%	400	250 PPM as K ₂ O
Calcium (Ca)	3.75%	75	47 PPM as Ca
Magnesium (Mg)	1.12%	22	14 PPM as Mg
1.12% Water Soluble Magnesium (Mg)			
Boron (B)	0.01%	0.2	0.13 PPM as B
Copper (Cu)	0.01%	0.2	0.13 PPM as Cu
0.01% Chelated Copper (Cu)			
Iron (Fe)	0.15%	3.0	1.88 PPM as Fe
0.15% Chelated Iron (Fe)			
Manganese (Mn)	0.05%	1.0	0.63 PPM as Mn
0.05% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.0079%	0.158	0.10 PPM as Mo
Zinc (Zn)	0.02%	0.42	0.27 PPM as Zn
0.02% Chelated Zinc (Zn)			

Derived from Ammonium Nitrate, Ammonium Phosphate, Potassium Nitrate, Calcium Nitrate, Magnesium Nitrate, Borax, Sodium Molybdate and the EDTA form of Copper, Manganese and Zinc with Iron in a 75:25 ratio of EDTA to DTPA. Potential basicity equivalent to 40 lbs. Calcium Carbonate per ton.

MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio-Premix 1.33 oz. in 1 gallon (10 grams per liter).

TANK: 0.09 oz. per gallon (0.67 grams per liter).

PROPORTIONER: 1:100 ratio use 8.89 oz. per gal. of concentrate (67 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.

OTHER PPM: Multiply desired PPM times weight divided by 100. Increase or decrease PPMN according to crop response.

NITROGEN PARTS PER MILLION CHART

Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	.67	1.33	2.00	2.67	4.00	5.33
1:50	2.23	4.45	6.67	8.89	13.34	17.78
1:100	4.45	8.89	13.34	17.78	26.67	35.56
1:200	8.90	17.78	26.67	35.56	53.34	*
1:300	13.35	26.67	40.02	53.34	*	*

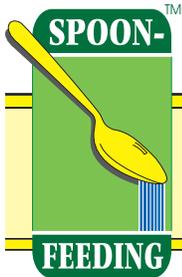
EC (+ - 10%) mmhos/cm .35 .70 1.05 1.40 2.10 2.80

*Maximum solubility approx. 3 lbs 8 ozs. per gallon

To Order Use Code:

25 lb Bag: 150320+B

Plant Marvel Laboratories, Inc.
 371 East 16th Street
 Chicago Heights, IL 60411
 www.plantmarvel.com
 Fax 708-757-5224
 Phone 800-524-7031



Cal-Mag 15-5-15 PLUS with 5% Ca and 2% Mg

- **NPK Ca Mg and trace elements all in one mix.**
- **High nitrate N.**
- **Quickly corrects Ca deficiencies.**
- **Excellent alternate feed for many crops.**

Cal-Mag Special 15-5-15 PLUS supplies most of its nitrogen in the nitrate form and is an ideal feed for crops responsive to nitrate nitrogen during low light periods and all ammonium sensitive plants. It is also an ideal source of calcium and magnesium that is immediately available and ideal for overcoming a calcium deficiency. It will maintain solubility in concentrate tank when calcium nitrate and/or magnesium nitrate are added. To avoid calcium precipitation do not mix with other fertilizers or materials that contain phosphate or sulfur compounds.

MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio-Premix 1.33 oz. in 1 gallon (10 grams per liter).

TANK: 0.09 oz. per gallon (0.67 grams per liter).

PROPORTIONER: 1:100 ratio use 8.89 oz. per gal. of concentrate (67 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.

OTHER PPM: Multiply desired PPM times weight divided by 100. Increase or decrease PPMN according to crop response.

For Continuous Liquid Feeding

Guaranteed Analysis

15-5-15+	Percentage	Lbs/Ton	Concentration
Total Nitrogen (N)	15%	300	200 PPM as N
2.84% Ammoniacal Nitrogen			
12.16% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	5%	100	67 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	15%	300	200 PPM as K ₂ O
Calcium (Ca)	5.0%	100	67 PPM as Ca
Magnesium (Mg)	2.0%	40.0	28 PPM as Mg
Boron (B)	0.02%	0.40	0.27 PPM as B
Copper (Cu)	0.01%	0.20	0.13 PPM as Cu
0.01% Chelated Copper (Cu)			
Iron (Fe)	0.10%	2.0	1.39 PPM as Fe
0.10% Chelated Iron (Fe)			
Manganese (Mn)	0.05%	1.00	0.67 PPM as Mn
0.05% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.007%	0.142	0.09 PPM as Mo
Zinc (Zn)	0.008%	0.16	0.11 PPM as Zn
0.008% Chelated Zinc (Zn)			

Derived from Ammonium Phosphate, Potassium Nitrate, Ammonium Nitrate, Calcium Nitrate, Magnesium Nitrate, Borax, Sodium Molybdate, Copper EDTA, Iron EDTA, Manganese EDTA and Zinc EDTA. CAUTION: This fertilizer is to be used on soils which responds to molybdenum. Crops high in molybdenum are toxic to grazing animals. Potential basicity equivalent to 62 lbs. calcium carbonate per ton.

GREENHOUSE

Below are suggested feeding rates for various crops. These rates should be adjusted according to crop response. Use the Nitrogen PPM chart (below left) to determine how much fertilizer is required for each gallon of concentrate.

CROP	CONSTANT	INTERMITTENT
Bedding plants	100-150	200-250
Cut flowers	150-250	275-425
Foliage plants	100-200	200-300
Geraniums	250-300	350-400
Lilies	250-300	350-400
Mums	250-300	350-400
Plugs	50-125	150-225
Woody plants	50-100	150-350

To Order Use Code:

25 lb Bag: 150515+

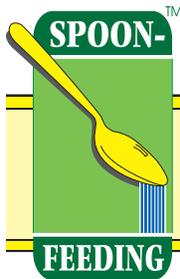
NITROGEN PARTS PER MILLION CHART

Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	.67	1.33	2	2.67	4	5.33
1:50	2.22	4.44	6.66	8.89	13.33	17.77
1:100	4.44	8.89	13.33	17.77	26.66	35.54
1:200	8.89	17.77	26.66	35.54	53.31	*
1:300	13.33	26.66	39.98	53.31	*	*

EC (+/- 10%) mmhos/cm .18 .36 .54 .72 1.07 1.43

*Maximum solubility approx. 60 oz. per gallon





Poinsettia Special 15-5-25 PLUS

- **Produces deep rich colors**
- **Complete trace element package including high levels of molybdenum**
- **High potash to promote strong stems**

With high levels of nitrate nitrogen, magnesium, low boron, but with increased levels of trace elements including higher levels of molybdenum, Poinsettia Special 15-5-25^{PLUS} has been specially formulated for poinsettia's unique fertility requirements. It promotes excellent color, sturdy stems better control of growth. It can generally be used throughout the crops growing cycle

or in combination with Nutriculture Hi-Cal 15-0-15^{PLUS} which will provide calcium. Begin use early in the plant growth cycle providing 250-300 PPM nitrogen as a constant feed. Regulate the concentration based on growth response and weather conditions. After pinching, reduce level of fertilization for 7-10 days to encourage stem elongation. When Bracts begin to develop color, reduce fertilizer rates to 200 PPM Nitrogen or less.

Guaranteed Analysis (For continuous liquid feeding)			
15-5-25+	Percent	Lbs/Ton	Concentration at
Total Nitrogen (N)	15%	300	200 PPM as N
4.22% Ammoniacal Nitrogen			
10.78% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	5%	100	67 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	25%	500	333 PPM as K ₂ O
Magnesium (Mg)	1.35%	27	18 PPM as Mg
Sulfur (S)	1.82%	36	24 PPM as S
1.82% Combined Sulfur (S)			
Boron (B)	0.02%	0.40	0.27 PPM as B
Copper (Cu)	0.05%	1.0	0.67 PPM as Cu
0.05% Chelated Copper (Cu)			
Iron (Fe)	0.10%	2.0	1.33 PPM as Fe
0.10% Chelated Iron (Fe)			
Manganese (Mn)	0.05%	1.0	0.67 PPM Mn
0.05% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.0733%	1.5	1.00 PPM as Mo
Zinc (Zn)	0.05%	1.0	0.67 PPM as Zn
0.05% Chelated Zinc (Zn)			

Derived from Ammonium Nitrate, Ammonium Phosphate, Potassium Nitrate, Magnesium Sulfate, Borax, Sodium Molybdate, and the EDTA form of Copper, Iron, Manganese and Zinc. CAUTION: This fertilizer is to be used on soils which respond to molybdenum. Crops high in molybdenum are toxic to grazing animals. Potential acidity equivalent to 50 lbs. Calcium Carbonate per ton.

MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio- Premix 1.33 oz. in 1 gallon (10 grams per liter).

TANK: 0.09 oz. per gallon (0.67 grams per liter).

PROPORTIONER: 1:100 ratio use 8.89 oz. per gal. of concentrate (67 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.

OTHER PPM: Multiply desired PPM times weight divided by 100.

Increase or decrease PPM according to crop response.

To Order Use Code:

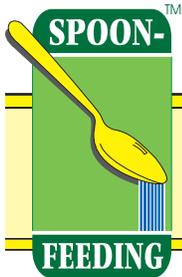
25 lb Bag: 150525+

NITROGEN PARTS PER MILLION CHART

Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	.67	1.33	2.0	2.67	4.0	5.33
1:50	2.22	4.45	6.67	8.89	13.33	17.77
1:100	4.44	8.89	13.33	17.77	26.66	35.54
1:200	8.88	17.78	26.66	35.54	53.31	*
1:300	13.32	26.67	39.99	53.31	*	*

EC (+ - 10%) mmhos/cm .38 .76 1.14 1.52 2.28 3.04

*Maximum solubility approx. 60 oz. per gallon



K-Mag 15-5-30 PLUS

- Promotes stiff stems and sturdy leaf growth.
- High nitrate N.
- Provides magnesium.
- Helps prevent tip burn.

This high potash formula is ideal for overcoming potash deficiency or for building up hardness and fibrous qualities of stems and leaves. May be applied in solution by a proportioner through sprinkler systems, by irrigation or any conventional ground rig and may be applied in combination with most insecticides, herbicides and fungicides. Avoid applications during peak sunlight hours.

TURF: Increase the amount of water used to dilute the fertilizer when soil moisture is low. Increase concentrations when soil moisture is high. Use caution when concentration is 1 lb. or more per 5 gallons of water. Apply every week to ten days at the rate of 1 lb. (1/8 lb. of actual N) per 1000 sq. ft. of area, dissolved in approximately 10 to 20 gallons of water. See the chart below left for turf application rates. For free Spoon-Feeding recommendations guide for use on turf call your Plant Marvel distributor.

Guaranteed Analysis (For continuous liquid feeding)			
15-5-30+	Percent	Lbs/Ton	Concentration at
Total Nitrogen (N)	15%	300	200 PPM as N
2.82% Ammoniacal Nitrogen			
12.18% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	5%	100	67 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	30%	600	400 PPM as K ₂ O
Magnesium (Mg)	1.26%	25	16 PPM as Mg
Boron (B)	0.02%	0.4	0.27 PPM as B
Copper (Cu)	0.05%	1.0	0.67 PPM as Cu
0.05% Chelated Copper (Cu)			
Iron (Fe)	0.10%	2.0	1.33 PPM as Fe
0.10% Chelated Iron (Fe)			
Manganese (Mn)	0.05%	1.0	0.67 PPM Mn
0.05% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.0005%	0.01	0.01 PPM as Mo
Zinc (Zn)	0.03%	0.62	0.41 PPM as Zn
0.03% Chelated Zinc (Zn)			

Derived from Ammonium Nitrate, Potassium Nitrate, Potassium Phosphate, Magnesium Nitrate, Sodium Molybdate, and the EDTA form of Copper, Iron, Manganese and Zinc. Potential basicity equivalent to 72 lbs. Calcium Carbonate per ton.

MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio- Premix 1.33 oz. in 1 gallon (10 grams per liter).

TANK: 0.09 oz. per gallon (0.67 grams per liter).

PROPORTIONER: 1:100 ratio use 8.89 oz. per gal. of concentrate (67 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.

OTHER PPM: Multiply desired PPM times weight divided by 100. Increase or decrease PPMN according to crop response.

TURF RATES PER SQUARE FOOT

Desired Pounds of Nitrogen per 1000 square feet	1/10	1/8	1/4	1/2	1
Fertilizer required in ounces	10.67	13.33	26.67	53.33	106.67
Pounds required per acre	29.05	36.29	72.61	145.19	290.41
Desired Grams of Nitrogen per square meter	0.49	0.61	1.22	2.44	4.88
Fertilizer required in grams	3.3	4.1	8.1	16.3	32.6
Kilograms required per hectare	33	41	81	163	326
Fertilizer required in kilograms per 500 sq. meter	1.65	2.05	4.05	8.15	16.3

NITROGEN PARTS PER MILLION CHART

Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	.67	1.33	2.0	2.67	4.0	5.33
1:50	2.22	4.45	6.67	8.89	13.33	17.77
1:100	4.44	8.89	13.33	17.77	26.66	35.54
1:200	8.88	17.78	26.66	35.54	53.31	*
1:300	13.32	26.67	39.99	53.31	*	*

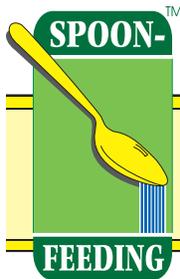
EC (+ - 10%) mmhos/cm. 368 .73 1.11 1.47 2.21 2.95

*Maximum solubility approx. 60 oz. per gallon

To Order Use Code:

25 lb Bag: 150530+K





Pot Mum Special 15-10-30 PLUS

- **Ideal basic feed for most mature mum varieties**
- **High potash to stiffen stems**
- **Excellent alternate feed**

This formula is high in potash to help stiffen stems and promote hardy fibrous qualities. It is an excellent blend that will harden up any crop that requires a higher potash content but was specifically blended with pot mums in mind. Pot Mum Special 15-10-30^{PLUS} is the ideal feed to overcome

nitrogen and potash deficiencies in mature pot mums. Promotes improved resistance to fungus diseases and increases the fibrous content in stems and leaves.

MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio- Premix 1.41 oz. in 1 gal.
 TANK: 2.22 oz. per 25 gals.
 PROPORTIONER: 1:100 ratio use 9 oz. per gal. of concentrate
 OTHER RATIOS: Multiply ratio times ounces divided by 100
 OTHER PPM: Multiply desired PPM times ounces divided by 100

Guaranteed Analysis (For continuous liquid feeding)			
15-10-30+ at	Percent	Lbs/Ton	Concentration
Total Nitrogen (N)	15%	300	200 PPM as N
3.98% Ammoniacal Nitrogen			
9.21% Nitrate Nitrogen			
1.81% Urea Nitrogen			
Available Phosphate (P ₂ O ₅)	10%	200	133 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	30%	600	400 PPM as K ₂ O
Magnesium (Mg)	0.05%	1.0	0.67 PPM as Mg
Sulfur (S)	1.97%	3.9	2.63 PPM as S
1.97% Combined Sulfur (S)			
Boron (B)	0.02%	0.4	0.27 PPM as B
Copper (Cu)	0.05%	1.0	0.67 PPM as Cu
0.05% Chelated Copper (Cu)			
Iron (Fe)	0.10%	2.0	1.3 PPM as Fe
0.10% Chelated Iron (Fe)			
Manganese (Mn)	0.05%	1.0	0.67 PPM as Mn
0.05% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.0009%	0.018	0.012 PPM as Mo
Zinc (Zn)	0.05%	1.0	0.67 PPM as Zn
0.05% Chelated Zinc (Zn)			

Derived from Ammonium Nitrate, Ammonium Sulfate, Ammonium Phosphate, Potassium Nitrate, Urea, Magnesium Nitrate, Borax, Sodium Molybdate and the EDTA form of Copper, Iron, Manganese and Zinc. CAUTION: This fertilizer is to be used on soils which responds

NITROGEN PARTS PER MILLION CHART

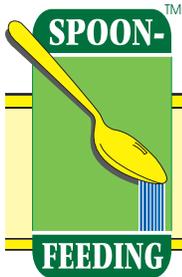
Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	.67	1.33	2.0	2.67	4.0	5.33
1:50	2.22	4.45	6.67	8.89	13.33	17.77
1:100	4.44	8.89	13.33	17.77	26.66	35.54
1:200	8.88	17.78	26.66	35.54	53.31	*
1:300	13.32	26.67	39.99	53.31	*	*

EC (+ - 10%) mmhos/cm .71 1.06 1.42 2.12 2.83

*Maximum solubility approx. 60 oz. per gallon

To Order Use Code:

25 lb Bag: 151030+



Cal Mag Special 16-3-16 PLUS

With Multiple Forms of Iron

- **Ideal basic feed for most low light situations.**
- **Multiple forms of iron chelation to work over a broad pH range.**

Developed as an alternative to our Cal Mag 17-5-17+ to give greater control over vegetative growth without sacrificing the calcium and magnesium. It has a neutral potential acidity, and it also contains a combination of three different forms of iron chelates, EDTA, DTPA, and EDDHA, that makes

iron available over a broader pH range, as well as in wet soil conditions. It will ensure availability under alkaline soil conditions.

It also helps control the tendency to stretch and promotes healthier growth while inducing excellent longer-keeping blooms.

For Continuous Liquid Feeding

Guaranteed Analysis

16-3-16+	Percent	Lbs/Ton	Concentration at
Total Nitrogen (N)	16%	320	200 PPM as N
3.36% Ammoniacal Nitrogen			
12.64% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	3%	60	37.5 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	16%	320	200 PPM as K ₂ O
Calcium (Ca)	4.0%	82	51.13 PPM as Ca
Magnesium (Mg)	2.0%	41	25.75 PPM as Mg
2.0% Water Soluble Magnesium (Mg)			
Boron (B)	0.02%	4	0.25 PPM as B
Copper (Cu)	0.01%	0.2	0.13 PPM as Cu
0.01% Chelated Copper (Cu)			
Iron (Fe)	0.10%	2.10	1.31 PPM as Fe
0.10% Chelated Iron (Fe)			
Manganese (Mn)	0.05%	1	0.63 PPM as Mn
0.05% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.008%	0.02	0.01 PPM as Mo
Zinc (Zn)	0.042%	0.84	0.53 PPM as Zn
0.042% Chelated Zinc (Zn)			

Derived from Ammonium Nitrate, Monopotassium Phosphate, Potassium Nitrate, Calcium Nitrate, Magnesium Nitrate, Borax, Sodium Molybdate, Copper EDTA, Iron EDTA, Iron EDDHA, Iron DTPA, Manganese EDTA and Zinc EDTA. Potential basicity equivalent to 8 lbs. Calcium Carbonate per ton.

CAUTION: This product is to be used on crops which respond to molybdenum. Crops high in molybdenum are toxic to grazing animals.

Information regarding the contents and levels of metals in this product is available on the internet at <http://www.aapfco.org/metals.htm>

MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYERS: 1:15 ratio-Premix 1.33 oz. per gal.

TANK: 2.08 oz. per 25 gals.

PROPORTIONER: 1:100 ratio use 8.31 oz. per gal. of concentrate.

OTHER RATIOS: Multiply ratio times ounces divided by 100.

OTHER PPM: Multiply desired PPM times ounces divided by 100.

To Order Use Code:

25 lb Bag: 160316+

MiniMax Bag:
500 to 2000 lb bag M160316+

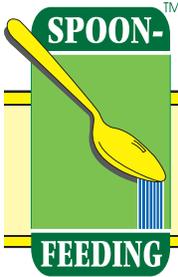
NITROGEN PARTS PER MILLION CHART

Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	0.62	1.25	1.87	2.50	3.75	5.0
1:50	2.08	4.17	6.25	8.33	12.5	16.66
1:100	4.17	8.33	12.5	16.66	25.0	33.32
1:200	8.33	16.66	24.99	33.32	50.0	*
1:300	12.5	24.99	37.49	49.98	*	*

EC (+/- 10%) mmhos/cm .34 .68 1.02 1.36 2.04 2.72

*Maximum solubility approx. 3lbs 12ozs. per gallon





Low Acid Special 17-4-15 PLUS

- Fully chelated micronutrient package with two forms of iron.
- High levels of nitrate nitrogen.
- Excellent source of calcium and magnesium.

This formulation has been designed for growers with a water alkalinity of 100PPM to 150PPM. Two forms of chelated iron provide better uptake over a wider range of soil pH.

Elevated magnesium makes this an ideal fertilizer for low magnesium water. Its high nitrate to ammonium ratio makes for an excellent dark weather fertilizer.

For Continuous Liquid Feeding			
Guaranteed Analysis			
17-4-15+	Percent	Lbs/Ton	Concentration at
Total Nitrogen (N)	17%	340	200 PPM as N
4.42% Ammoniacal Nitrogen			
12.58% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	4%	80	47.06 PPM as P ₂ O ₅
Total Potash (K ₂ O)	15%	300	176.47 PPM as K ₂ O
Calcium (Ca)	4.0%	80	47.05 PPM as Ca
Magnesium (Mg)	1.7%	34	20.0 PPM as Mg
1.7% Water Soluble Magnesium (Mg)			
Boron (B)	0.020%	0.4	0.24 PPM as B
Copper (Cu)	0.020%	0.4	0.24 PPM as Cu
0.020% Chelated Copper (Cu)			
Iron (Fe)	0.110%	2.2	1.29 PPM as Fe
0.110% Chelated Iron (Fe)			
Manganese (Mn)	0.050%	1.0	0.59 PPM as Mn
0.050% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.0008%	0.016	0.01 PPM as Mo
Zinc (Zn)	0.049%	0.98	0.58 PPM as Zn
0.049% Chelated Zinc (Zn)			
Derived from Ammonium Nitrate, Calcium Nitrate, Monopotassium Phosphate, Potassium Nitrate, Magnesium Sulfate, Borax, Copper EDTA, Iron EDTA, Iron DTPA, Manganese EDTA, Sodium Molybdate, and Zinc EDTA.			
Potential acidity equivalent to 79 lbs calcium carbonate per ton.			

MIXING RATE FOR 200 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio- Premix 2.35 oz. per gallon (17.65 grams per liter).

TANK: 0.16 oz. per gallon (1.18 grams per liter).

PROPORTIONER: 1:100 ratio use 15.68 oz. per gal. of concentrate (118 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.

OTHER PPM: Multiply desired PPM times weight divided by 100.

Increase or decrease PPM according to crop response.

NITROGEN PARTS PER MILLION CHART

Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	0.59	1.18	1.76	2.35	3.53	4.7
1:50	1.96	3.92	5.88	7.84	11.88	15.68
1:100	3.92	7.84	11.76	15.68	23.50	31.36
1:200	7.84	15.68	23.52	31.36	47.0	62.72
1:300	11.76	23.52	35.28	47.04	*	*

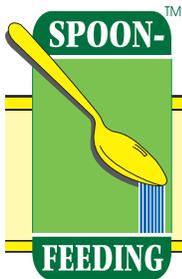
Conductivity .34 .68 1.01 1.37 2.04 2.74
(+ - 10%) mmhos/cm

*Maximum solubility approx. 3 lbs 8 ozs. per gallon

Available in standard 25 lb bag

To Order Use Code:

25 lb Bag: 170415+



Nutriculture®

Cal-Mag 17-5-17 PLUS

With 4% Calcium and 1% Magnesium

- **NPK, Ca, Mg and trace elements all in one mix**
- **High Nitrate N**

This Cal-Mag Special formula is probably very close to being the perfect fertilizer all in one bag. It contains all the major, secondary and minor elements almost any crop would need. NPK, calcium, magnesium, six trace elements and a very high ratio of nitrogen in

nitrate form. The calcium to magnesium ratio is perfectly proportioned so that they will not impede one another's uptake by acting as antagonists. And while slightly on the acid side, this formula allows the delivery of these essential cations without a major impact on media pH.

Guaranteed Analysis

(For continuous liquid feeding)

17-5-17+	Percent	Lbs/Ton	Concentration at
Total Nitrogen (N)	17%	340	200 PPM as N
4.33% Ammoniacal Nitrogen			
12.67% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	5%	100	58.82 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	17%	340	200 PPM as K ₂ O
Calcium (Ca)	4.0%	80	48.20 PPM as Ca
Magnesium (Mg)	1.0%	22	13.2 PPM as Mg
1.0% Water soluble Magnesium (Mg)			
Boron (B)	0.02%	0.4	0.24 PPM as B
Copper (Cu)	0.02%	0.4	0.24 PPM as Cu
0.02% Chelated Copper (Cu)			
Iron (Fe)	0.10%	2.0	1.2 PPM as Fe
0.10% Chelated Iron (Fe)			
Manganese (Mn)	0.05%	1	.59 PPM as Mn
0.05% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.0007%	0.014	0.01 PPM as Mo
Zinc (Zn)	0.05%	1	0.59 PPM as Zn
0.05% Chelated Zinc (Zn)			

Derived from Ammonium Nitrate, Potassium Nitrate, Calcium Nitrate, Magnesium Nitrate, Borax, Sodium Molybdate, Iron EDTA, Copper EDTA, Manganese EDTA and Zinc EDTA. CAUTION: This fertilizer is to be used on soils which responds to molybdenum. Crops high in molybdenum are toxic to grazing animals. Potential acidity is equal to 52 pounds calcium carbonate per ton.

MIXING RATE FOR 200 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio-Premix 2.35 oz. per gallon (17.65 grams per liter).

TANK: 0.16 oz. per gallon (1.18 grams per liter).

PROPORTIONER: 1:100 ratio use 15.68 oz. per gal. of concentrate (118 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.

OTHER PPM: Multiply desired PPM times weight divided by 100.

Increase or decrease PPM according to crop response.

NITROGEN PARTS PER MILLION CHART

Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	0.59	1.18	1.76	2.35	3.53	4.7
1:50	1.96	3.92	5.88	7.84	11.88	15.68
1:100	3.92	7.84	11.76	15.68	23.50	31.36
1:200	7.84	15.68	23.52	31.36	47.0	62.72
1:300	11.76	23.52	35.28	47.04	*	*

Conductivity .34 .68 1.01 1.37 2.04 2.74
(+ - 10%) mmhos/cm

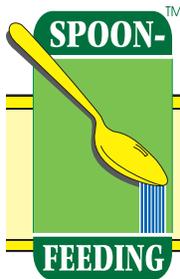
*Maximum solubility approx. 3 lbs 8 ozs. per gallon

Available in standard 25 lb bag, 5 lb bags packed 6 per case, and bulk bags in 500, 750, 1000, or 2000lbs.

To Order Use Code:

25 lb Bag: 170517+
Case 6X5lb bgs PM5170517
Bulk Bag: M170517+

 **Plant Marvel**
Laboratories, Inc.
371 East 16 th Street
Chicago Heights, IL 60411
www.plantmarvel.com
Fax 708-757-5224
Phone 800-524-7031



Potted Plant Special 18-3-18 PLUS

With 6.65% Calcium

- Contains phosphorus, calcium and magnesium all in one feed.
- Chelated trace elements
- High nitrate nitrogen

This formula contains calcium and a very high ratio of its nitrogen in nitrate form and is ideal for potted plants or other crops with high calcium requirements and as a general purpose feed for geraniums and plants that are grown in low light situations. It has an

almost neutral pH that will minimize any impact on media pH.

MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio- Premix 1.11 oz. per gallon (8.33 grams per liter).

TANK: 0.07 oz. per gallon (0.56 grams per liter).

PROPORTIONER: 1:100 ratio use 7.40 oz. per gal. of concentrate (56 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.

OTHER PPM: Multiply desired PPM times weight divided by 100. Increase or decrease PPM according to crop response.

Guaranteed Analysis (For continuous liquid feeding)

18-3-18+	Percent	Lbs/Ton	Concentration at
Total Nitrogen (N)	18%	360	200 PPM as N
4.24% Ammoniacal Nitrogen			
13.76% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	3%	120	66.67 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	18%	360	200 PPM as K ₂ O
Calcium (Ca)	6.65%	133	73.9 PPM as Ca
Magnesium (Mg)	0.18%	3.6	2 PPM as Mg
Boron (B)	0.02%	0.4	0.2 PPM as B
Copper (Cu)	0.02%	0.4	0.2 PPM as Cu
0.02% Chelated Copper (Cu)			
Iron (Fe)	0.10%	2.0	1.16 PPM as Fe
0.10% Chelated Iron (Fe)			
Manganese (Mn)	0.03%	0.6	0.33 PPM as Mn
0.03% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.005%	0.1	0.06 PPM as Mo
Zinc (Zn)	0.015%	0.3	0.17 PPM as Zn
0.015% Chelated Zinc (Zn)			

Derived from Ammonium Nitrate, Potassium Nitrate, Calcium Nitrate, Ammonium Phosphate, Magnesium Sulfate, Borax, Sodium Molybdate, Copper EDTA, Iron EDTA, Manganese EDTA and Zinc EDTA. CAUTION: This fertilizer is to be used on soils which responds to molybdenum. Crops high in molybdenum are toxic to grazing animals. Potential basicity equivalent to 51 lbs. Calcium Carbonate per ton.

NITROGEN PARTS PER MILLION

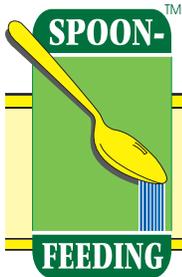
Injector Ratio	Ounces per gallon of water for concentrate.			
	100 PPM	150 PPM	200 PPM	300 PPM
1:50	3.70	5.55	7.40	11.11
1:100	7.40	11.11	14.81	22.21
1:150	11.25	16.87	22.50	33.75
1:200	14.81	22.21	29.62	44.43
1:300	22.21	33.32	44.43	*

EC+ - 10% mmhos/cm 0.68 1.01 1.37 2.04

*Maximum solubility approx. 60 ozs. per gallon

To Order Use Code:

25 lb Bag: 180318+



Flowering Pot Plant Special 18-6-15 PLUS
Including Boron

- **Contains NPK Ca Mg and six minor elements**
- **Almost neutral pH**
- **High nitrate nitrogen**

This analysis has been put together based on the southern California potted plant recipe developed years ago by O. A. Matkin, and still followed today by many growers. It supplies all the nutrients in a single bag that southern California growers have been historically applying to their crops, without the need to measure out each

individual element or add acid to improve water quality. This fertilizer will provide for ease of mixing, while permitting a single injector to proportion the rate.

For continuous liquid feeding
Guaranteed Analysis

18-6-15+	Percent	Lbs/Ton	Concentration at
Total Nitrogen (N)	18%	360	200 PPM as N
5.19% Ammoniacal Nitrogen			
12.81% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	6%	120	66.67 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	15%	300	166 PPM as K ₂ O
Calcium (Ca)	6%	123	68.67 PPM as Ca
Magnesium (Mg)	0.16%	3.2	1.78 PPM as Mg
Boron (B)	0.02%	0.4	0.22 PPM as B
Copper (Cu)	0.02%	0.4	0.22 PPM as Cu
0.02% Water Soluble Copper (Cu)			
Iron (Fe)	0.11%	2.26	1.26 PPM as Fe
0.11% Chelated Iron (Fe)			
Manganese (Mn)	0.06%	1.20	0.67 PPM as Mn
0.06% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.023%	0.466	0.26 PPM as Mo
Zinc (Zn)	0.025%	0.50	0.28 PPM as Zn
0.025% Chelated Zinc (Zn)			

Derived from Ammonium Nitrate, Potassium Phosphate, Calcium Nitrate, Potassium Nitrate, Sodium Molybdate, Copper Sulfate, Iron EDTA, Manganese EDTA and Zinc EDTA. CAUTION: This fertilizer is to be used on crops which respond to molybdenum. Crops high in molybdenum are toxic to grazing animals. Potential acidity equivalent to 95 lbs. Calcium Carbonate per ton.

MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio-Premix 1.11 oz. per gallon (8.33 grams per liter).

TANK: 0.07 oz. per gallon (0.56 grams per liter).

PROPORTIONER: 1:100 ratio use 7.40 oz. per gal. of concentrate (56 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.

OTHER PPM: Multiply desired PPM times weight divided by 100.

Increase or decrease PPMN according to crop response.

NITROGEN PARTS PER MILLION CHART

Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	0.56	1.11	1.67	2.22	3.33	4.44
1:50	1.85	3.70	5.55	7.40	11.11	14.81
1:100	3.70	7.40	11.11	14.81	22.21	29.62
1:200	7.40	14.81	22.21	29.62	44.43	59.24
1:300	11.11	22.21	33.32	44.43	*	*

EC (+ - 10%) mmhos/cm.347 .694 1.04 1.389 2.08 2.78

*Maximum solubility approx. 60 oz. per gallon

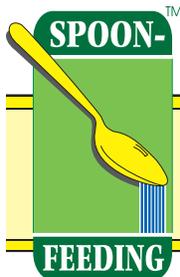
Available in standard 25 lb bag.

To Order Use Code:

25 lb Bag: 180615+WB

750lb Bulk Bag: M180615+WB





Mag-Iron Special 18-6-18 PLUS

Provides Iron and Magnesium over a broad pH range

- **Elevated iron chelated in two forms to handle a broader media pH range**
- **High magnesium**
- **High nitrate nitrogen**

Formulated for growers with high calcium bicarbonate water who need to compliment their magnesium level, while supplying additional iron to ensure uptake at an elevated media pH. The higher iron levels are provided in two different chelated forms, EDTA and HDTPA. These will guarantee uptake even at extremely high

media pH levels. This formula is also recommended as an excellent choice for managing lush green controlled growth on annuals such as calibrochoa, petunias, vinca, roses etc. With over 60% of its nitrogen in the nitrate form it will also work well as a dark weather feed.

MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio- Premix 1.11 oz. per gallon (8.33 grams per liter).

TANK: 0.07 oz. per gallon (0.56 grams per liter).

PROPORTIONER: 1:100 ratio use 7.40 oz. per gal. of concentrate (56 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.

OTHER PPM: Multiply desired PPM times weight divided by 100.

Increase or decrease PPM according to crop response.

Guaranteed Analysis (For continuous liquid feeding)

18-6-18+	Percent	Lbs/Ton	Concentration at
Total Nitrogen (N)	18%	360	200 PPM as N
7.15% Ammoniacal Nitrogen			
10.85% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	6%	120	66.67 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	18%	360	200 PPM as K ₂ O
Magnesium (Mg)	1.30%	26	14.5 PPM as Mg
Sulfur (S)	2.35%	27	26.1 PPM as S
2.35% Combined Sulfur (S)			
Boron (B)	0.02%	0.4	0.2 PPM as B
Copper (Cu)	0.02%	0.4	0.2 PPM as Cu
0.02% Chelated Copper (Cu)			
Iron (Fe)	0.20%	4.0	2.22 PPM as Fe
0.20% Chelated Iron (Fe)			
Manganese (Mn)	0.05%	1.0	0.5 PPM as Mn
0.05% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.001%	0.02	0.01 PPM as Mo
Zinc (Zn)	0.05%	1.0	0.5 PPM as Zn
0.05% Chelated Zinc (Zn)			

Derived from Ammonium Nitrate, Ammonium Sulfate, Potassium Phosphate, Potassium Nitrate, Magnesium Sulfate, Boron, Sodium Molybdate and the form of Copper EDTA, Iron EDTA, Iron DTPA, Manganese EDTA and Zinc EDTA. CAUTION: This fertilizer is to be used on soils which respond to molybdenum. Crops high in molybdenum are toxic to grazing animals. Potential acidity equivalent to

NITROGEN PARTS PER MILLION CHART

Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	0.56	1.11	1.67	2.22	3.33	4.44
1:50	1.85	3.70	5.55	7.40	11.11	14.81
1:100	3.70	7.40	11.11	14.81	22.21	29.62
1:200	7.40	14.81	22.21	29.62	44.43	59.24
1:300	11.11	22.21	33.32	44.43	*	*

EC (+ - 10%) mmhos/cm.34 .68 1.01 1.35 2.03 2.70

*Maximum solubility approx. 60 oz. per gallon

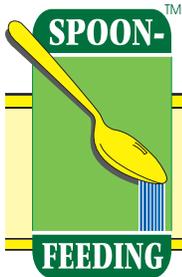
Available in standard 25 lb bag and 5 lb bags packed 6 per case.

To Order Use Code:

25 lb Bag: 180618+

Case of 6x5lb: PM5180618





Cal-Mag GP 20-5-20 PLUS

With 2% Calcium and .25% Magnesium

- **Contains phosphorus, calcium and magnesium all in one feed.**
- **Chelated trace elements**
- **High nitrate nitrogen**

The GP stands for general purpose because this is probably one of the most useful nutritional blends ever developed. It can be used as a general feed for a variety of crops. Two thirds of its nitrogen is in the nitrate form making it an acceptable fertilizer for crops responsive to nitrate nitrogen during low light periods. The reduced amount of phosphorous

will provide for greater control of inter nodal stretch and it is an excellent alternative to 20-10-20 that will provide other needed nutrients without pushing excessive growth. It is also an ideal source of calcium as well as some magnesium that is immediately available. It will maintain solubility in the concentrate tank when additional calcium nitrate and/or magnesium nitrate are added. Proper balance of Ca, Mg, and K permits better utility of N. To avoid calcium precipitation do not mix with materials that contain phosphates or sulfates.

Guaranteed Analysis (For continuous liquid feeding)

20-5-20+	Percentage	Lbs.Per	Concentration
Total Nitrogen	20%	400	200 PPM of N
6.67% Ammoniacal N			
13.33% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	5%	100	50 PPM of P ₂ O ₅
Soluble Potash (K ₂ O)	20%	400	200 PPM of K ₂ O
Calcium (Ca)	2.0%	40	20.9 PPM of Ca
Magnesium (Mg)	0.25%	5	2.6 PPM of Mg
Boron (B)	0.02%	0.4	0.2 PPM of B
Copper (Cu)	0.05%	1	0.5 PPM of Cu
0.05% Chelated Copper (Cu)			
Iron (Fe)	0.10%	2	1.04 PPM of Fe
0.10% Chelated Iron (Fe)			
Manganese (Mn)	0.05%	1	0.5 PPM of Mn
0.05% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.002%	0.04	0.03 PPM of Mo
Zinc (Zn)	0.05%	1	0.51 PPM of Zn
0.05% Chelated Zinc (Zn)			

Derived from Ammonium Nitrate, Potassium Phosphate, Potassium Nitrate, Calcium Nitrate, Magnesium Nitrate, Borax, Sodium Molybdate, and the EDTA form of Copper, Iron, Manganese and Zinc. CAUTION: This fertilizer is to be used on soils which responds to molybdenum. Crops high in molybdenum are toxic to grazing animals. Potential Acidity equivalent to 235 lbs. Calcium Carbonate per ton

Cal-Mag GP was designed for growers with relatively pure water as an ammonium based feed containing calcium and magnesium. This material dissolves completely in tap water or well water. It will dissolve almost instantly in hot water. Its ability to stay in solution without precipitation makes it ideal for applying by tank, spray rig, or through all injector systems and even the finest misting nozzles.

MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio-Premix 1 oz. per gallon (7.5 grams per liter).

TANK: 0.07 oz. per gallon (0.5 gram per liter).

PROPORTIONER: 1:100 ratio use 6.66 oz. per gal. of concentrate (50 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.

OTHER PPM: Multiply desired PPM times weight divided by 100.

To Order Use Code:

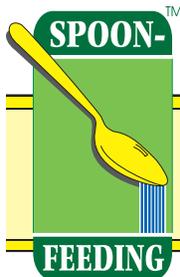
25 lb Bag: 200520+

NITROGEN PARTS PER MILLION CHART

Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	0.5	1	1.5	2	3	4
1:50	1.67	3.33	5	6.66	10	13.33
1:100	3.33	6.66	10	13.33	19.99	26.66
1:200	6.66	13.33	19.99	26.66	39.98	53.3
1:300	10.0	19.99	29.99	39.98	59.98	*

EC (+ - 10%) mmhos/cm .33 .65 .98 1.3 1.96 2.62

*Maximum solubility approx. 3 lbs 8 ozs. per gallon



Mum Marvel 20-7-20 PLUS

- **Iron Chelation for broad pH range**
- **Reduces High Alkalinity**
- **Gives Better Color**

Mum Marvel 20-7-20 PLUS is designed for outdoor chrysanthemum production. It has good nitrate to ammonium ratio. The balanced minor element package has two forms of iron chelation to maintain it's availability over a pH range that can run to slightly

basic. Mum Marvel 20-7-20 is excellent as a foliar feed.

In soil applications it has the ability to neutralize 1-1/2 times as many bicarbonates making this analysis ideal for growers with high alkalinity.

Guaranteed Analysis (For Continuous Liquid Feed)			
20-7-20+ Alkaline	Percentage	Lbs/Ton	Concentration
Total Nitrogen (N)	20%	400	200 PPM as N
8.9% Ammoniacal Nitrogen			
11.1% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	7%	140	70 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	20%	400	200 PPM as K ₂ O
Magnesium (Mg)	0.2%	4	2.0 PPM as Mg
Sulfur (S)	2.9%	58.4	29 PPM as S
2.9% Combined Sulfur (S)			
Boron (B)	0.0%	0.0	0.0 PPM as B
Copper (Cu)	0.05%	0.1	0.5 PPM as Cu
0.05% Water Soluble Copper (Cu)			
Iron (Fe)	0.15%	3.0	1.50 PPM as Fe
0.15% Chelated Iron (Fe)			
Manganese (Mn)	0.05%	1.0	0.50 PPM as Mn
0.05% Water Soluble Manganese (Mn)			
Molybdenum (Mo)	0.0005%	0.01	0.005 PPM as Mo
Zinc (Zn)	0.05%	1.0	0.5 PPM as Zn
0.05% Water Soluble Zinc (Zn)			
Derived from Ammonium Nitrate, Ammonium Sulfate, Potassium Phosphate, Borax, Sodium Molybdate, Iron EDTA (0.10%), Iron DTPA (0.05%) the Sulfate form of Copper, Manganese, and Zinc. CAUTION: This fertilizer is to be used on soils which responds to molybdenum. Crops high in molybdenum are toxic to grazing animals. Potential acidity equivalent to 520 lbs. Calcium Carbonate per ton.			

MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio- Premix 1 oz. per gallon (7.5 grams per liter).

TANK: 0.07 oz. per gallon (0.5 gram per liter).

PROPORTIONER: 1:100 ratio use 6.66 oz. per gal. of concentrate (50 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.

OTHER PPM: Multiply desired PPM times weight divided by 100.

Increase or decrease PPM according to crop response.

NITROGEN PARTS PER MILLION CHART

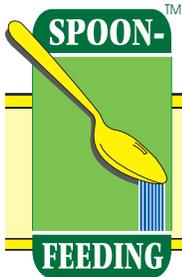
Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	0.5	1	1.5	2	3	4
1:50	1.67	3.33	5	6.66	10	13.33
1:100	3.33	6.66	10	13.33	19.99	26.66
1:200	6.66	13.33	19.99	26.66	39.98	53.3
1:300	10.0	19.99	29.99	39.98	59.98	*

EC (+-10%) mmhos/cm .33 .65 .99 1.30 1.95 2.60

*Maximum solubility approx. 60 ozs. per gallon

To Order Use Code:

25 lb Bag: 200720+MM



General Purpose 20-10-20 PLUS

- **Higher levels of Nitrate N**
- **Fully Chelated Minors**
- **100% Soluble**

General Purpose 20-10-20^{PLUS} is an all purpose feed with elevated levels of Nitrate Nitrogen to give better nutritional control when feeding the cool darker months. Commonly used as a foliar application or root feed on ornamentals, turf and nursery stock.

Because it is formulated to provide a balance of both major and minor elements, it is a safe choice when feeding a wide range of plant life with the same fertilizer. It will provide immediate but gentle nourishment in a form of application that can overcome and bypass other nutrient complication due to soil problems.

Guaranteed Analysis (For continuous liquid feeding)
20-10-20+

	Percent	Lbs/Ton	Concentration at
Total Nitrogen (N)	20%	400	200 PPM as N
7.90% Ammoniacal Nitrogen			
12.10% Nitrate Nitrogen			
Available Phosphate (P ₂ O ₅)	10%	200	100 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	20%	400	200 PPM as K ₂ O
Magnesium (Mg)	0.11%	2.2	1.1 PPM as Mg
0.11% Water Soluble Magnesium (Mg)			
Sulfur (S)	0.16%	3.2	1.6 PPM as S
0.16% Combined Sulfur (S)			
Boron (B)	0.02%	0.40	0.20 PPM as B
Copper (Cu)	0.05%	1.0	0.50 PPM as Cu
0.05% Chelated Copper (Cu)			
Iron (Fe)	0.10%	2.0	1.0 PPM as Fe
0.10% Chelated Iron (Fe)			
Manganese (Mn)	0.05%	1.0	0.50 PPM as Mn
0.05% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.01%	0.20	0.10 PPM as Mo
Zinc (Zn)	0.05%	1.0	0.50 PPM as Zn
0.05% Chelated Zinc (Zn)			

Derived from Ammonium Nitrate, Potassium Phosphate, Potassium Nitrate, Borax, Sodium Molybdate; and Copper EDTA, Iron EDTA, Manganese EDTA and Zinc EDTA. CAUTION: This fertilizer is to be used on soils which responds to molybdenum. Crops high in molybdenum are toxic to grazing animals. Potential acidity equivalent to 420 lbs. Calcium Carbonate per ton.

MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio-Premix 1 oz. per gallon (7.5 grams per liter).
 TANK: 0.07 oz. per gallon (0.5 gram per liter).
 PROPORTIONER: 1:100 ratio use 6.66 oz. per gal. of concentrate (50 grams per liter).
 OTHER RATIOS: Multiply ratio times weight divided by 100.
 OTHER PPM: Multiply desired PPM times weight divided by 100. Increase or decrease PPM according to crop response.

NITROGEN PARTS PER MILLION CHART

Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	0.5	1	1.5	2	3	4
1:50	1.67	3.34	5	6.67	10	13.33
1:100	3.33	6.67	10	13.33	20	26.6
1:200	6.66	13.34	20	26.66	39.99	53.32
1:300	9.99	20.01	30	39.99	*	*

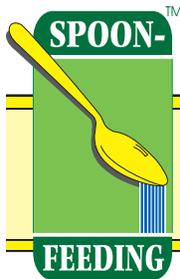
EC (+ - 10%) mmhos/cm .31 .62 .94 1.25 1.88 2.50

Available in standard 25 lb bag

To Order Use Code:

25 lb Bag: 201020+
 Case 6-5lb PM5201020





Acid Special 21-7-7 PLUS

- **Offsets high water alkalinity**
- **Lowers pH in the root zone**
- **Provides increased iron and sulfur as well as seven minor elements**
- **Helps overcome nutrient tie up in soil**

An effective formula that will help in lowering pH when irrigation water or media are high in alkalinity. Generally used as an occasional feed for correcting these problems in most crops and as a basic feed for acid loving woody ornamentals and foliage plants. Commonly used as a foliar application or root feed on ornamentals, turf and nursery stock.

Best results are obtained by monitoring media pH on a regular basis during use of this formula. It will provide immediate but gentle nourishment in a form of application that can overcome and bypass other nutrient complications due to high soil pH problems, and be-

cause amounts applied are tuned to the plants immediate needs there is minimal runoff or other environmental problems.

GENERAL DIRECTIONS

Mix one teaspoon per gallon of water. Apply solution liberally to base of plants, soaking the root area. For potted plants and hanging baskets etc. apply enough to create drainage through the pot. Wet foliage for fast acting leaf feeding. Repeat applications at every watering. Avoid applications during peak sunlight hours.

GREENHOUSE Suggested feeding rates for various crops range from 150 to 200 PPMN. These rates should be adjusted according to crop response. Use the Nitrogen PPM chart (below left) to determine how much fertilizer is required for each gallon of concentrate.

MIXING RATE FOR 100 PPM NITROGEN

HOSE END SPRAYER: 1:15 ratio- Premix 0.95 oz. per gallon (7.14 grams per liter).

TANK: 0.06 oz. per gallon (0.48 gram per liter).

PROPORTIONER: 1:100 ratio use 6.35 oz. per gal. of concentrate (48 grams per liter).

OTHER RATIOS: Multiply ratio times weight divided by 100.
OTHER PPM: Multiply desired PPM times weight divided by 100.
Increase or decrease PPMN according to crop response.

Guaranteed Analysis (For continuous liquid feeding)

21-7-7+	Percent	Lbs/Ton	Concentration
Total Nitrogen (N)	21%	420	200 PPM as N
14.00% Ammoniacal Nitrogen			
2.10% Nitrate Nitrogen			
4.90% Urea Nitrogen			
Available Phosphate (P ₂ O ₅)	7%	140	66 PPM as P ₂ O ₅
Soluble Potash (K ₂ O)	7%	140	66 PPM as K ₂ O
Sulfur (S)	10%	200	96 PPM as S
10% Combined Sulfur (S)			
Boron (B)	0.02%	0.4	0.1 PPM as B
Copper (Cu)	0.05%	1.0	0.4 PPM as Cu
0.05% Chelated Copper (Cu)			
Iron (Fe)	0.10%	2.0	0.9 PPM as Fe
0.10% Chelated Iron (Fe)			
Manganese (Mn)	0.05%	1.0	0.4 PPM as Mn
0.05% Chelated Manganese (Mn)			
Molybdenum (Mo)	0.0009%	0.018	0.01 PPM as Mo
Zinc (Zn)	0.05%	1.0	0.4 PPM as Zn
0.05% Chelated Zinc (Zn)			

Derived from Ammonium Sulfate, Ammonium Phosphate, Potassium Nitrate, Urea, Borax, Sodium Molybdate; Copper, Iron, Manganese and Zinc EDTA. CAUTION: This fertilizer is to be used on soils which responds to molybdenum. Crops high in molybdenum are toxic to grazing animals. Potential acidity equivalent to 1556 lbs. Calcium Carbonate per ton.

NITROGEN PARTS PER MILLION CHART

Parts per Million	50	100	150	200	300	400
Injector Ratios	Ounces required per gal of concentrate					
1:15	.48	.95	1.43	1.90	2.86	3.81
1:50	1.59	3.17	4.76	6.35	9.52	12.69
1:100	3.17	6.35	9.52	12.69	19.04	25.39
1:200	6.35	12.69	19.04	25.39	38.08	50.77
1:300	9.52	19.04	28.56	38.08	57.12 *	

EC (+-10%) mmhos/cm .31 .61 .92 1.22 1.83 2.44

*Maximum solubility approx. 60 oz. per gallon

To Order Use Code:

25 lb Bag: 210707+A

 **Laboratories, Inc.**
371 East 16 th Street
Chicago Heights, IL 60411
www.plantmarvel.com
Fax 708-757-5224
Phone 800-524-7031

Chemec® B
Chelated Minor Element Complex

Chemec is a completely soluble, high quality, concentrated micro nutrient compound in chelated form. The Iron has two forms of chelation to make it effective over a broad range of pH. It has the ability to correct a minor element deficiency through soil application even when test indicate an imbalance in the soil, because the chelate will protect its elements until the plant can assimilate them. It has the double benefit of being assimilated through the leaves when applied as a foliar feed. Designed as a supplemental feed when soil and/or tissue tests indicate a need. It can also be used to supplement a regular fertilizer application of just NPK. Chemec B is compatible with a broad range of fertilizer elements including those that contain calcium.

Guaranteed Analysis

Chemec B

Guaranteed Analysis	
Magnesium (Mg)	1.58%
Boron (B)	1.3%
Copper (Cu)	0.10%
0.10% Chelated Copper (Cu)	
Iron (Fe)	7.0%
7.0% Chelated Iron (Fe)	
Manganese (Mn)	2.0%
2.0% Chelated Manganese (Mn)	
Molybdenum (Mo)	0.06%
Zinc (Zn)	0.40%
0.40% Chelated Zinc (Zn)	

Derived from Magnesium Sulfate, Boric Acid, Sodium Molybdate, Iron EDTA, Iron EDDHA, Copper EDTA, Manganese EDTA, and Zinc EDTA.

CAUTION:

This fertilizer contains copper, iron, manganese, molybdenum and zinc and should be used only as recommended. It may prove harmful if mis-used.

CAUTION:

Molybdenum content is greater than 0.001% and application to forage crops must be avoided.

NOTE:

Rates given are to provide an adequate level of secondary nutrients guaranteed on this label. If additional secondary nutrients are being supplied from other sources, rates should be reduced

accordingly. Consult your crop advisor for interpretation of soil and foliar nutrient analysis. This product is not recommended for use in correcting single micro nutrient deficiencies.

Directions:

CHEMEC is a chelated water soluble nutrient mix which can be used as a supplement for crops grown in soil or in a regular feeding program for crops grown in artificial and soilless media where N-P-K fertilizers are used that don't contain micros.

To correct deficiencies:

Soil Applications: Always apply secondary nutrients to moist soil. For heavy feeders use 12 oz. on 1000 square feet in 120 gallons of water. For sensitive crops use 4 oz. on 10,000 square feet in 120 gallons of water. General Applications: Use 1/2 to 1 oz. per 100 gallons of water in a regular constant feed program.

For Use on Agriculture and Soil-Grown Greenhouse Crops as a Supplement: Apply through the irrigation system when soil test indicates a low level of secondary plant nutrients. For Use on Greenhouse Crops Grown in Artificial or Soilless Media: Use in the nutrient solution in conjunction with sources of nitrogen, phosphorous and potassium.



Sol-Trace®
Soluble Trace Element Mix

A non-chelated minor element mix that is highly soluble and designed for prevention or correction of micro nutrient deficiencies through foliar application or as a supplement along with NPK fertilizers. Stops yellow leafing, stunting and die back caused by micro nutrient deficiency. It will help develop better root structure and stimulate lush green foliage. It will provide automatic buffering of water with its high sulfur content and in addition will provide a balance of 6 more micro nutrients. Applied as a foliar spray, Sol-Trace will show results in a matter of days by by-passing soil related tie-ups.

Guaranteed Analysis

Sol-Trace	Percent
Sulfur (S)	14.00%
Boron (B)	1.45%
Copper (Cu).....	3.20%
Iron (Fe)	7.50%
Manganese (Mn).....	8.15%
Molybdenum (Mo)	0.046%
Zinc (Zn)	4.50%

Derived from Boric acid, Sodium Molybdate and the sulfate form of Copper, Iron, Manganese, and Zinc.

Directions

Nursery & Greenhouse

This material is immediately available when applied and should show results within days. Do not over apply. Use soil and tissue test as a guide.

When on a constant feeding schedule, using basic N-P-K fertilizers, the normal rate of application is 2 ozs. of Sol-Trace for every 25 lbs. of fertilizer material being applied.

As an occasional or supplemental application to bench crops, use 2 ozs. per 100 sq. ft. Do not repeat unless deficiency has definitely been established. For potted crops, use 2 ozs. in 25 gals. or 1/4 teaspoon in 1 gal. Apply as a normal saturation of root area. No repeat should be necessary.

Turf

Use soil and leaf tests as a guide. Do not apply in conjunction with fertilizers that have added micro nutrients (such as Nutriculture Plus formulas) unless test results indicate the need. In general, apply at the rate of 1 oz. per 1000 sq. ft. dissolved in 5 gals. of water or more. Apply in early morning while dew

is still on the ground or in late afternoon. Three to four applications per season at four to six week intervals should be adequate. Do not apply during periods of moisture stress or disease.

Mor-Green®
7% Iron Chelate

For use on iron-deficient soils, Mor-Green is a preventive and cure of iron chlorosis in lawns, trees and flowering shrubs. Unlike many irons, Plant Marvel's Mor-Green is 100 percent water-soluble, allowing extremely rapid green-up when applied as a soil treatment or foliar spray. Mor-Green improves disease resistance. Compatible with most fungicide and herbicide sprays and other chemicals, Mor-Green is an EDTA iron chelate (technical sodium ferric ethylenediamine triacetate) and is formulated in a highly concentrated form for maximum economy.

Guaranteed Analysis

Mor-Green	Percent
Iron (Fe)	7.00%
10.00% as Fe ₂ O ₅	
Technical (Fe) Ethylenediamine Triacetate	

Directions

Mor-Green dissolves completely in tap or well water. It will dissolve almost instantly in hot water. Its ability to stay in solution without precipitation makes it ideal for applying through all injector systems and even the finest misting nozzles. Foliar: Because of its complete and high solubility, this formula is ideal as a foliar feed.

Soil Treatment:

Mor-Green should be distributed uniformly over the surface of the treated area and thoroughly watered in to a depth of six inches into the soil. To obtain even distribution, dissolve in water and spray or sprinkle on soil, or, apply dry after mixing with a suitable quantity of sand, soil or other material to cover area. Standard dilution rate is one pound to 100 gals. of water.

Golf Greens and Lawn

Grasses: 1 lb. of Mor-Green in 100 gals. of water treats 4,000 sq. ft. Repeat monthly throughout the season, using eight ounces per 50 gals. of water alone, or, in combination with fungicide or fertilizer, per 4,000 sq. ft. Dry form application should be at the rate of 20 lbs. per acre.

Nursery and Green-

house: Dissolve 1/4 pound in 100 gals. of water for each 400 sq. ft. of bench area or bed. For dry application, mix 1 lb. with enough sand or soil to cover 1,600 sq. ft. of area and water in thoroughly.

Foliar Spray: Dissolve one pound in 100 gals. of water. Thoroughly wet the foliage of the plants treated.

Aqua-Sol® Fe

Three Chelated Irons

Three irons with the most advanced chelation available to cover the complete pH spectrum. Completely soluble and compatible with most water based application materials.

Aqua-Sol Fe 13%

Derived from Sodium Ferric Ethelenediaminetetraacetic Acid. For correction of Iron chlorosis in acid soils.

Aqua-Sol Fe 11%

Derived from Diethelenediaminepentaacetic Acid. For correction of Iron deficiencies in slightly alkaline and calcareous conditions.

Aqua-Sol Fe 6%

Derived from Sodium Ferric Ethelenediamine di-(hydroxyphenylacetate) For correction of Iron deficiency in alkaline and calcareous conditions.

For correction of iron chlorosis in turf, ornamental plants and trees including azaleas, roses, rhododendrons, pin oaks and sweet gums, and other plants growing in soils of varying pH range. Unlike many irons, Plant Marvel's Aqua-Sol Iron Chelates are completely water-soluble, thus making them extremely rapid in green-ing properties when applied as a soil treatment or foliage spray. They are non-caking and free-flowing which allow them to be used with most commonly used insecticides, fungicides and fertilizers. Application may be made alone or in combination with our Nutriculture family of plant foods.

Directions

These three Aqua-Sol Fe products cover a broad spectrum of growing conditions. Proper selection and use depends on knowledge of the pH of the media being treated and should include tissue analysis with recommendations by a qualified plant nutritionist.

Greenhouse: Apply as a soil drench using 2 to 3 oz. per 100 gals. of water (approx. 30 PPM Fe) Repeat applications may be made, if needed, in 1 to 2 weeks.

Lawns and Turf: Apply 1/2 lb. per 1,000 sq. ft. Mix thoroughly with fertilizer or water. Apply evenly. Water in thoroughly. Use 1/2 the above rate on greens. Aqua-Sol Fe13% dissolves completely in tap water or well water. It will dissolve almost instantly in hot water. Its ability to stay in solution without precipitation makes it ideal for applying through all injector systems and even the finest misting nozzles. Foliar: Because of its complete and high solubility, this formula is ideal as a foliar feed.

Ornamental shrubs

and bushes, small

trees, etc.: Soil application - For each foot of height, use 1-1/2 ounces well distributed under branches. May be applied as liquid by dissolving the required amount in a convenient amount of water.

Garden Flowers: Soil application - Use 1-1/2 ounces per 100 feet or row. For individual plants in garden use 1/3 ounce. May be applied as liquid by dissolving the required in a convenient amount of water. For potted plants, water normally, no more than once per month, with a solution

containing 1/3 ounce per gallon of water.

Trees, citrus, other fruit and ornamentals.

(Trunk diameter over 6 inches.): Soil application - Apply 1 to 3 pounds per tree depending on age, size of tree and extent of chlorosis. May be applied as required in a convenient amount of water.

Mag Iron®
6% Iron, 4.5% Magnesium

MAG-IRON is a highly effective source of Magnesium and Iron which is essential for the growth and development of all plants. MAG-IRON releases to the soil Magnesium and Iron in a form that can be easily assimilated by the plant. Because it is chelated with EDTA, it does not block the assimilation of other plant food elements. MAG-IRON aids in absorption and translocation of phosphorus, increasing the yield and quality of the crop. 100% water-soluble, it may be applied as a foliar spray or as a soil drench.

MAG-IRON contains penetrating and wetting agents to enhance its effectiveness, and a blue tracer dye that tells at a glance when feeding is through or a problem develops at application. MAG-IRON is compatible with other water based agricultural sprays and fertilizers and may be combined for treatment.

Guaranteed Analysis

Mag-Iron	Percent
Magnesium (Mg)	4.5%
Iron (Fe)	6.0%

Derived from Iron EDTA and Magnesium Sulfate.

Directions

Soil Treatment: Mag-Iron should be distributed uniformly over the surface of the treated area and thoroughly watered in to depth of six inches into the soil. To obtain even distribution, dissolve in water and spray or sprinkle on soil, or apply dry after mixing, with a suitable quantity of sand, soil or other material to cover area. Standard dilution rate for Mag-Iron is 1 pound to 100 gallons of water.

Field Crops

Foliage - 1 lb. per acre in convenient amount of water to cover an acre, after plants are established. Soil - Band or side dress up to 10 lbs. per acre.

Vegetable Crops

Foliage - 1 lb. per acre in convenient amount of water to cover an acre, after plants are established. Soil - Band or side dress up to 10 lbs. per acre.

Nursery

Foliage - 1 lb. in 100 gals. of water. Soil - For bed or row application apply 2 to 5 oz. per 100 sq. ft.

Fruit & Nut Crops

Foliage - 1/2 lb. per 100 gals. of water and apply as a thorough cover spray prior to bloom or after harvest.

Soil - 1 to 2 lbs. per tree based on size. For berry crops, band or side dress 1 lb. per 100 ft. of row.

Greenhouse Ornamen-

tals

Soil Drench - Use 1/4 lb. in 100 gals. of water (approx. 19 PPM Fe) to cover 400 sq. ft. of bench or bed. Soil Mix - 1 lb. in enough soil to cover 1600 sq. ft. of area or 200 cu. ft. of soil.

Foliage Spray: Dissolve 1 pound of Mag-Iron in 100 gallons of water; thoroughly wet the foliage of plants treated.

Use on evergreens, oaks, citrus, apple, pear, magnolia as well as other fruit and ornamental trees. Also, spray shrubs and ornamentals such as roses, rhododendrons, azaleas, camellias, hibiscus, ixora, holly, etc.

Golf Greens and Lawn

Grasses: 1 pound of

Mag-Iron in 100 gallons of water treats 4,000 sq. ft. Repeat monthly throughout season, using 8 ounces per 50 gallons of water alone, or in combination with fungicide or fertilizer, per 4,000 sq. ft. This is done to maintain soil's iron content, due to removal of grass clippings. Dry form applications should be at the rate of 20 pounds per acre.



Sodium Molybdate

Plant Marvel Laboratories offers pre-measured packets of Sodium Molybdate as a supplemental feed.

Molybdenum is a very important trace element in the production of high quality poinsettias. Deficiency causes young as well as mature leaf yellowing, upward rolling and edge burn of leaf. Supplemental Molybdenum should be included in the fertility program of poinsettias from start to finish.

Pre-measured, easy to use, one ounce packets of Sodium Molybdate are packaged 25 per box. Plant Marvel's pre-measured packets with simple directions make it easy. Simply dissolve contents into a gallon of water for a Stock Solution (SS) that can be easily used to achieve the recommended rate of 0.1 PPM constant feed (or .2 PPM intermittent feed).

Sodium Molybdate 39.66% Mo

To make a Stock Solution (SS) dissolve contents (1 oz. packet) in 1 gallon of water. Use this SS as follows

For 0.1 PPM Mo use: 5 oz. SS in 1000 gallons
 1/2 oz. SS in 100 gallons

100:1 injector - 1/2 oz. SS in 1 gallon
200:1 injector - 1 oz. SS in 1 gallon

Blue Tracer Dye

An easy way to verify the performance of proportioners and injector systems. When added to the concentrate stock tank, a tinge of blue at the emitter will indicate that the dye (and fertilizer etc.) is getting through the proportioner to the plants. It is a highly concentrated liquid non-staining blue dye that is non-toxic and easy to use.

Suggested Rate of Use:

1:100 Injector: Use 1 cap full to 5 gallons of stock solution.

1:200 Injector: Use 2 cap fulls to 5 gallons of stock solution.

OBR

Citric Acid Organic Bicarbonate Reducer

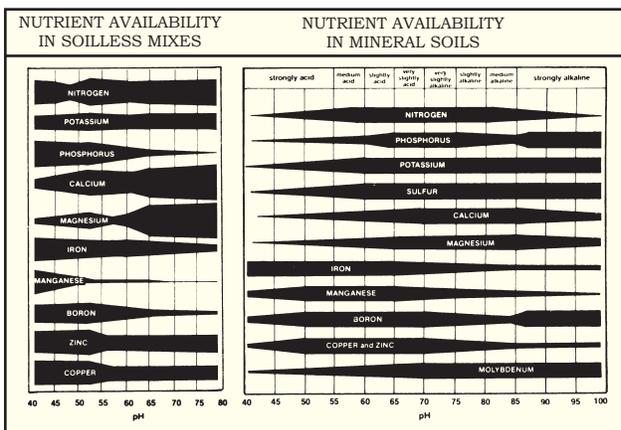
- **Powerful and fast acting pH reducer**

- **Nonhazardous and easy to handle**

- **Compatible with most water based add-ons**

For most crops, irrigation water and the soil should have a pH that is slightly on the acid side, that is 5.5 to 6.5 pH. This range puts nutrient availability at maximum. Water Alkalinity determines how much acid will be required to move the pH a given amount. Higher levels of Alkalinity require proportionately more acidifier to move the pH down to where it should be. An analysis of the irrigation water to determine both pH and alkalinity is essential to proper use of this product. Bicarbonates and carbonates are the major components of water alkalinity and are generally expressed as PPM CaCO_3 or as meq/L. Use the recommendation of the laboratory or your nutritionist when determining where alkalinity needs to be. OBR is an Organic Bicarbonate (and pH)

Reducer that is derived from Citric Acid. It has the advantage over harsh mineral based "Hazmat" acids, like Nitric, Phosphoric or Sulfuric Acid, of being nonhazardous and easy to handle, easily dissolves in water and is highly compatible with other water soluble products. While eye protection, gloves and an apron are recommended there is no requirement for special handling and equipment and storage does not require lock and key. It has been known to cause minor skin and eye irritation and should be handled with respect.



These charts are meant as a guide to show how pH levels affects the availability and release of fertilizer nutrients. The use of OBR to reduce alkalinity in the irrigation water will also have an effect on the soil pH when used on a constant basis.

OUNCES OF OBR CITRIC ACID REQUIRED PER 100 GALLONS OF WATER TO NEUTRALIZE "X" PPM CaCO_3 *

"X"=PPM CaCO_3 to Neutralize	meq/L	Ounces OBR required
10	0.20	0.182
25	0.50	0.455
50	1.00	0.910
75	1.50	1.365
100	2.00	1.820
125	2.50	2.275
150	3.00	2.730
175	3.50	3.180
200	4.00	3.640
225	4.50	4.095
250	5.00	4.550

*Use as a guideline only. Follow up adjustments with testing to verify alkalinity.

Example: Your alkalinity is 225 PPM CaCO_3 (4.50 meq/L). You want to reduce the alkalinity to 125.

225-125=100 PPM CaCO_3 to neutralize. Look up 100 PPM in the far left column.

From the table you need to mix 1.820 oz of OBR in 100 gallons of water at HOSE END. If injecting at 1:100, you need to mix 1.820 oz per gallon of stock.