



Maximize Production using Liquid Fertilizer

**“At Pattison’s, our
Customer Support
Comes with Every
Purchase”**

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Canada S0A 2B0**



Liquid Fertilizer Facts

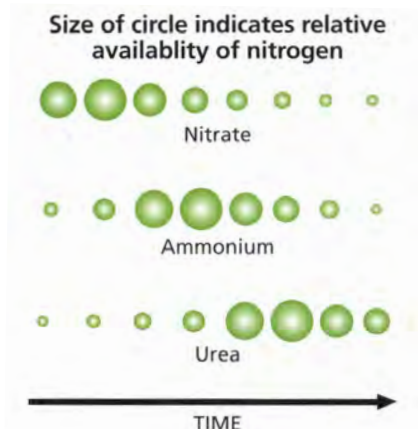
Nitrogen Solution 28-0-0 Provides Phased Crop Feeding

Urea ammonium nitrate (UAN) 28-0-0 is composed of three forms of nitrogen that deliver phased-release crop feeding. It contains 25% nitrate nitrogen, 25% ammonium nitrogen, and 50% urea. The nitrate portion is available for immediate crop uptake. When soil conditions are favourable for plant growth and microbial activity, the ammonium nitrogen and the urea are gradually converted to nitrate nitrogen early in the growing season for crop uptake.

Nitrogen Increases Yield and Improves Quality

Nitrogen is an essential part of protein. Plants take up large amounts of nitrogen in the early stages of growth, of which some may be stored for latter use. Nitrogen is required throughout all growth stages of the plant. An inadequate supply of nitrogen can result in yellowing of older leaves, stunted plant growth, increased damage from root disease, and loss of yield. In wheat a shortage of nitrogen will also have an adverse effect on protein content. At low levels of nitrogen supply, the available nitrogen will be used for vegetative growth at the expense of protein content.

In wheat, a shortage of nitrogen will also have an adverse effect on protein content. In hard red spring wheat a content level of less than 13.2% is an indication of inadequate nitrogen. Maximizing yield and protein content can be achieved with the proper application timing of nitrogen.



UAN 28-0-0 is the only nitrogen fertilizer that contains all three forms of nitrogen, which is ideal for crop production. Maximizing yield and protein content can be achieved with the proper application timing of nitrogen. The addition of nitrogen over and above the recommended levels at the start of the growing season may simply lead to over-growth and lodging of the crop, and have a negative impact on yield. However, an additional application of nitrogen later in the season can have a significant and positive effect on protein content.



Phosphate Solution 10-34-0 Required Early in Growing Season

Ammonium polyphosphate 10-34-0 is a liquid containing 10% nitrogen and 34% Phosphate. The phosphate is composed of about 70% polyphosphate and 30% orthophosphate. Unlike most granular dry phosphate, 10-34-0 is 100% water soluble, and is easily blended with liquid nitrogen and sulphur to form a homogeneous phosphate blend of solution fertilizer.

Since Phosphate is not mobile in the soil, it is critical to place fertilizer phosphate within easy reach of the developing root system. An adequate supply of phosphate early in the plant life is essential for seed formation. It also enhances early maturity of the crop, greater straw strength, improved quality of grain crops, and increased disease resistance.



Though hard to identify, the consequences of a phosphate deficiency can be grave. Research indicates that phosphate deficiency at early growth stages can cause non-recoverable loss in yield. Wheat accumulates about 20-40% of shoot phosphate during the first month after emergence. Research also shows that almost all the remaining accumulation occurs during the next month, so early phosphate uptake is critical. Seed placed liquid phosphate is ideally suited for this.

Sulphur Solution 15-0-0-20 Provides Continuous Crop Feeding

Liquid sulphur ammonium thiosulphate (ATS) 15-0-0-20 is an excellent source of sulphur for crops. When applied to the soil, ATS forms colloidal sulphur and ammonium sulphate. The sulphate

portion is available for immediate uptake by the crop. The colloidal S is oxidized by micro-organisms to sulphate sulphur, thus extending the time that sulphur is made available to the crop during the growing season. When applied in a band, ATS can reduce the PH level of the soil around the treated area, and enhance the availability of the other nutrients such as phosphorus, iron, and manganese. Liquid Sulphur, ATS is a clear solution and is easily blended with liquid nitrogen UAN 28-0-0 and liquid phosphate APP 10-34-0 to provide a total nutrient package for your crop.



Sulphur – Key to Crop Yield and Quality

Sulphur is a major constituent of plant protein, and is essential for producing high yielding, high quality crops. Without sulphur, crops are unable to make efficient use of other nutrients, and will not reach their full potential. Sulphate sulphur ATS, 15-0-0-20 is the form of sulphur most available to the plants. It is soluble in water and follows the movement of soil moisture. Canola is particularly sensitive to sulphur deficiencies, and responds well to ATS applications, showing higher yields and better oil content.

The symptoms of sulphur deficiency are often confused with nitrogen deficiency. In most soils, sulphur reserves exist primarily in organic matter, and are released with nitrogen when decomposition occurs. The grey wooded soils usually carry more sulphur while black well drained soils contain less.

Agronomics and Economics of using Liquid Fertilizer:

Make the most of your fertilizer investment

Agronomic Benefits

Research has shown that 40-70% of applied nitrogen is taken up by the crop in any given crop year. The challenge for farmers is to maximise crop uptake of every pound of nitrogen that is applied. Timing and placement are important considerations. Applying nutrients as close as possible to the time when the crop requires them is critical to maximize nutrient uptake. Positioning the nutrient in the root zone can also enhance crop uptake.

The handling simplicity and flexibility of liquid fertilizer provides the grower an opportunity to improve crop yield and quality, reducing crop fertilizer costs, minimizing risk, and freeing up management time.

Because of the versatility, liquid fertilizers give farmers effective options in both timing and placement of the crop nutrients. Not only can liquids be applied in the fall, and in the spring, before and during seeding, but also effectively applied after crop emergence. This window of application gives the grower an opportunity to manage crop production, and reduce production risk of nutrient loss and damage. Some growers like to assess crop yield and income potential before deciding the final level of crop nutrients to apply. To maximize crop yields, post emergent applications of nitrogen and sulphur should not be delayed beyond the 4-5 leaf stage in wheat and the bolting stage in canola.

Economic Benefits

Placing liquid fertilizer in a concentrated band also helps to maximize nutrient uptake by reducing immobilization and enhancing nutrient interaction. Liquid fertilizer can be applied beneath the soil or post emergent. The adoption of single pass seeding with low disturbance seed openers has greatly enhanced the ability to precisely place the nutrients. By seeding and applying liquid fertilizer in one operation growers can achieve the most effective fertilizer placement, reduce moisture loss, and have the crop seeded on a more timely basis.



The timing and application flexibility, the accuracy of placement, and the ability to apply a concentrated band of liquid fertilizer provides farmers with opportunities to gain more from each pound of nutrient applied. In recent years technology has advanced to allow seeding equipment to individually control sections of the drill. Being able to control sections of the seeding equipment has reduced operational costs. Liquid fertilizer application systems with sectional control can easily be added to also enhance the reduction of fertilizer costs.

LIQUID FERTILIZER PRODUCT SPECIFICATIONS

28-0-0	
S.G. @60°F/15.5° C	1.275
lbs/Gal. U.S.	10.63
lbs/Gal. Imp.	12.75
lbs N/Gal. U.S.	2.98
lbs N/Gal. Imp	3.57
U.S. Gal/Ton	188.15
Imp. Gal/Tonne	172.86
Liters/Tonne	785.83
SALT OUT Temp	0°F
SALT OUT Temp	-18°C
pH	7.0

10-34-0	
S.G. @60°F/15.5° C	1.40
lbs/Gal. U.S.	11.67
lbs/Gal. Imp.	14.00
lbs N/Gal. U.S.	1.17
lbs N/Gal. Imp	1.40
U.S. Gal/Ton	171.38
Imp. Gal/Tonne	157.43
Liters/Tonne	715.68
P ₂ O ₅ /Gal U.S.	3.97
P ₂ O ₅ /Gal Imp.	4.76
SALT OUT Temp	-4°F
SALT OUT Temp	-20°C
pH	5.9

15-0-0-20	
S.G. @60°F/15.5° C	1.310
lbs/Gal. U.S.	10.92
lbs/Gal. Imp.	13.10
lbs N/Gal. U.S.	1.64
lbs N/Gal. Imp	1.96
U.S. Gal/Ton	183.15
Imp. Gal/Tonne	168.24
lbs S/Gal U.S.	2.18
lbs S/Gal Imp.	2.62
Litres/Tonne	764.82
SALT OUT Temp	-5°F
SALT OUT Temp	-15°C
pH	7.5

Economic Benefits

The ease of blending liquid fertilizers gives the growers an opportunity to custom blend their own fertilizer to match the nutrients required for each field. Micronutrients such as Zn, Cu, Fe, Mn, Mo, and B can be blended and applied in either a seed row or top dressing/foiar application. It is usually more effective to correct a micronutrient deficiency by soil testing and applying the micro nutrient during seeding in a liquid blend.

"The benefits of using Liquid Fertilizer on our farm are the efficiencies of sectional control and the ease of variable rating. We can dramatically vary rates and never have to worry about plugging seed/fertilizer hoses or adjusting fan speed. We have greatly extended our time between fills, by having a large air cart and a 5200 gal liquid caddy wagon. We spend less time filling and more time seeding. Liquid also gives us the flexibility of changing our fertilizer blends or easily adding micros as needed. We have our own on farm storage and a Pattison Blend Station."

**-Fred Stilborn, Shadow Creek Farms Ltd.
Balcarres SK**

Nitrogen Stabilizer

In recent years products have come to market that greatly reduce the loss of nitrogen due to ammonia volatilization, denitrification and nitrate leaching. When blended with UAN – 28-0-0, nitrogen stabilizers contain urease enzyme inhibitors that protects against all three forms of nitrogen loss. These products are available in both dry and liquid formulations and are easily blended with the liquid fertilizer prior to storage or application.

"The versatility of liquid fertilizer gives us the ability for full sectional control and to VR our N and S as a side band and place our Phos and micros in a consistent band safely in the seed row, where it should be. When using liquid at seeding time were able to take our nutrients out of the seed cart giving us the ability to cover huge acres between fills. The initial cost of the equipment (cart and kits) to get set up is a fraction of what this would be with dry or Nh3. We can also make our own blends on farm and store our own product safely and consistently. Also, when conditions are favourable for a bumper crop we have also found it hugely beneficial to top dress in crop with our sprayer by simply changing tips."

**-Darren Blyth, Black Lightning Bison
Waseca SK**



Methods of Application/ What's required to apply liquid fertilizer?

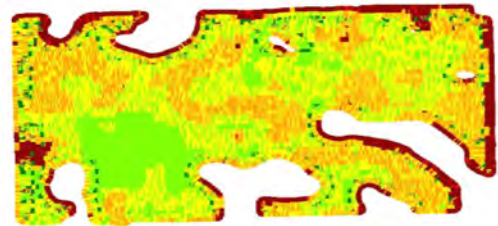
Seed Placed Fertilizer

Although liquid fertilizer offers many options to the methods of application, the most commonly used form is during seeding, with a direct single pass operation. The one-pass seed and fertilizer placement will provide key benefits in the farm operation.

- Increased yields from improved nutrient and moisture utilization
- Reduced labour, fuel and equipment costs
- Improved soil conditions
- Reduced carbon footprint

To realize these benefits, many growers are using the advantages of liquid fertilizer to simplify the single pass system. The ease of handling, with fewer delays and refilling stops, saves valuable time in the spring. Towing a liquid fertilizer cart greatly increases the acres covered between fills. The liquid cart will allow the seed cart to be used to it's full potential. The additional cost of increasing the size of your seed cart can be quite costly.

Liquid fertilizer is ideally suited for variable rate application with the option of sectional control. The Pattison variable rate distribution kit allows the grower to apply the nutrients based on a prescription maps. The on-board auto rate controller complete with boom sections will not only vary application rates to place nutrients at the desired levels, will also reduce fertilizer expense in the reduction of overlap. This precise placement of liquid fertilizer will also enhance even maturity of the crop with less lodging. Field mapping has proven the savings in fertilizer costs.



Seeded 296.6 acres, Fertilized 277.05



Distribution Kits

Today's custom-built Pattison distribution kits, are easily adapted to most seeding equipment. They offer even distribution throughout the seeding tool with the precise placement of the nutrients. The distribution systems can be used on seeding equipment with various row spacings from as small as 6" all the way up to today's planters with 30" rows. Not like kits in the past, these new systems are virtually drip free and will provide many years of trouble free operation. Keeping up with today's technology, they also offer either a fixed orifice or variable rate nozzle. Rates can range from low rates required for in row placement of phosphate and micro nutrients to higher application rates, applying a total nutrient package in a side band.

VR-Sectional Controlled Fertilizer Placement

The Pattison VR-Sectional Control System, is a complete pre-assembled package that is easily installed on most of today's seeding equipment. The systems allow the operator to achieve both low flow rates for in row phosphate placement, and higher rates for a total nutrient package. Available in up to 12 section systems, it can be matched to the seed sectional control, to only apply fertilizer when seed sections are activated. Field tested, the system is easily integrated with current onboard GPS rate control systems. The system is also ISOBUS compatible.



Methods of Application/ Equipment Required

Liquid Fertilizer Carts

Liquid fertilizer carts have evolved over the years from the early days when maximum tanks capacity was 800 gallons to now offering tank capacity sizes of up to 5200 usg. The decision of which tank capacity best suits the grower's operation will be based on how many acres they want to seed between fills. Pulling a liquid cart will free up more tank space in the seed cart allowing the grower to seed more acres between fills. The nutrient package that is to be delivered at seeding time will also dictate the liquid cart tank configuration.



For example, a grower wishes to apply 100 lbs. N/acre and has enough seed capacity to cover 120 acres. Total amount of liquid fertilizer 28-0-0 required to cover 120 acres will be 33.6 usg/acre or 4032 usg. Another example is the neighbor is required to apply in a blend 100lbs. N, 30 lbs. of P, and 15 lbs. of S per acre and has enough seed capacity to cover 120 acres. The total amount of liquid fertilizer required is 41 usg/acre. Or require a tank capacity of 4920 usg.

Liquid cart configurations are available in both a tow behind and tow between models. Some models of carts also allow to carry two types of liquid fertilizer products. This allows the grower to apply one nutrient package in the seed row and a second package as a side band. Carts can be customer built to meet the requirements of the grower offering either hydraulic driven and ground driven product pumps. High capacity fill pumps can have a cart filled and back into the field in less than 15 mins, reducing downtime and



Pattison Factory Installed Starter Phosphate Tank

increasing farm productivity. All our carts and distribution kits come with in line strainer to remove any foreign material.

Split Application

For small grains production, a split application, where part of the nitrogen is applied at seeding time as part of the regular fertilizer program and the remainder applied post emergent, can reduce risk. By splitting application, the field and growing conditions can be assessed early in the growing season to determine if additional nitrogen is required. In wheat, the post-emergent nitrogen application should occur prior to the 5 leaf stage, and in canola before bolting. Top-dress fertilizer is much more efficiently taken up by the roots, not by the leaves, so applications must reach the soil surface, ideally in a concentrated band. When applying with the sprayer, use dribble nozzles designed specifically for liquid fertilizer. In recent years nozzle technology has advanced to the point where we now have the availability to use a single nozzle to apply various application rates.



Storage and Handling

Many growers want the convenience of having liquid fertilizer storage located on their farm. Solution fertilizer can be stored in either Stainless steel and heavy, liquid fertilizer rated, poly tanks. The tanks should be inspected prior to use and cleaned inside and out on an annual basis. Liquid fertilizers are corrosive to metals. Avoid metals containing copper, zinc, and copper alloys such as brass or cast iron for storage. Aluminum should not be used to store 10-34-0. Valves and fittings on storage tanks should be made of either stainless steel or polypropylene. Poly valves should only be used on smaller capacity tanks.



Solution fertilizers, which can be stored over winter include, 28-0-0, 10-34-0, and 15-0-0-20. The following are precautions to be taken when over wintering solution fertilizers:

- Do not over winter liquid blends in storage
- Avoid storing a product for more than one winter
- Drain all lines and winterize pumps over winter
- Prior to spring application season, product will need to be recirculated

Circulate the liquid by drawing from one valve and pushing in to the second valve. When circulating it is a good idea to push the product through a 45-degree elbow mounted inside the tank. This will cause the product to move in a circular motion inside the tank. Bubbling or inducing air into a storage tank can also be very effective in mixing. All tanks purchased from Pattison's for storing liquid fertilizer, will include the proper bulkheads and fittings for proper circulation.



Fertilizer solutions do not freeze in the same manner that water freezes to ice. As the temperature falls to the "salt out" temperature of the product, the fertilizer forms crystals that drop out of solution. In the spring as temperature rises, the crystals return to solution. Circulating or bubbling the product in the spring helps to ensure that all the crystals return to solution.



On farm blending of liquid fertilizer has become more popular over the years. When blending fertilizer, agitation is required to achieve an homogeneous blend. If a tank mix is not used for blending it is important to load the product required in the least amount first and the one required in the greatest amount last. If blends are stored for extended periods of time, then recirculation will be required. Product is recommended to be pumped through in line strainers to remove any foreign material. Pattison's offer custom built blend stations with on farm consultation to meet the individual needs on your farm.

"Your Single Supplier of Liquid Handling Products"

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Expect the Best!

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