



# ARCTIC S 11-0-0 WITH 75% SULPHUR

Sulphur Made Easy

[www.northernnutrients.com](http://www.northernnutrients.com)





**ARCTIC**

# Arctic S

## Mission statement

Arctic S is a 75% micronized elemental Sulphur, providing the highest availability, lowest salt index fertilizer, and most versatility. It can be used to meet all, or some of a growers Sulphur demands.



An aerial photograph of a large industrial facility, likely a fertilizer plant, situated in a vast, flat, snow-covered landscape. The facility consists of several large, dark-colored buildings with gabled roofs, interconnected by a network of pipes and walkways. To the left of the main buildings, there are several large, cylindrical storage tanks and a smaller structure with a yellow crane. The ground is covered in a thick layer of snow, with some tracks and small patches of bare earth visible. In the background, more industrial structures and a distant horizon line are visible under a pale sky.

# HISTORY OF 11-0-0-75

Developed by Shell, the first factory began in Korea

From 2018 until 2021, Arctic S imported by NN into North America

Early 2022, Northern Nutrients built their plant and brought manufacturing to Saskatoon.

5 full years on the market in Western Canada and USA with an estimated 2 million acres used in 2023 between W. Can & the USA



# TECHNICAL FEATURES

Analysis:


11% Nitrogen

75% Micronized Elemental  
Sulphur

Arctic S Salt index of 17.8

Ammonium sulphate: 68.3

Ammonium thiosulphate: 90.4

Physical Properties	Sample		
	Urea Pastilles		Sulphur Pastille
<b>Crushing Strength</b> (Average*, kg/pastille)	1.46	3.48	2.31
<b>Crushing Strength</b> (Range*, kg/pastille)	0.90 – 2.05	1.05 – 6.35	1.60 – 3.10
<b>Abrasion Resistance</b> (% degradation)	1.31	1.94	4.25
<b>Impact Resistance</b> (% shattered pastilles)	0.44	1.14	16.23

## + APPLICATION FEATURES

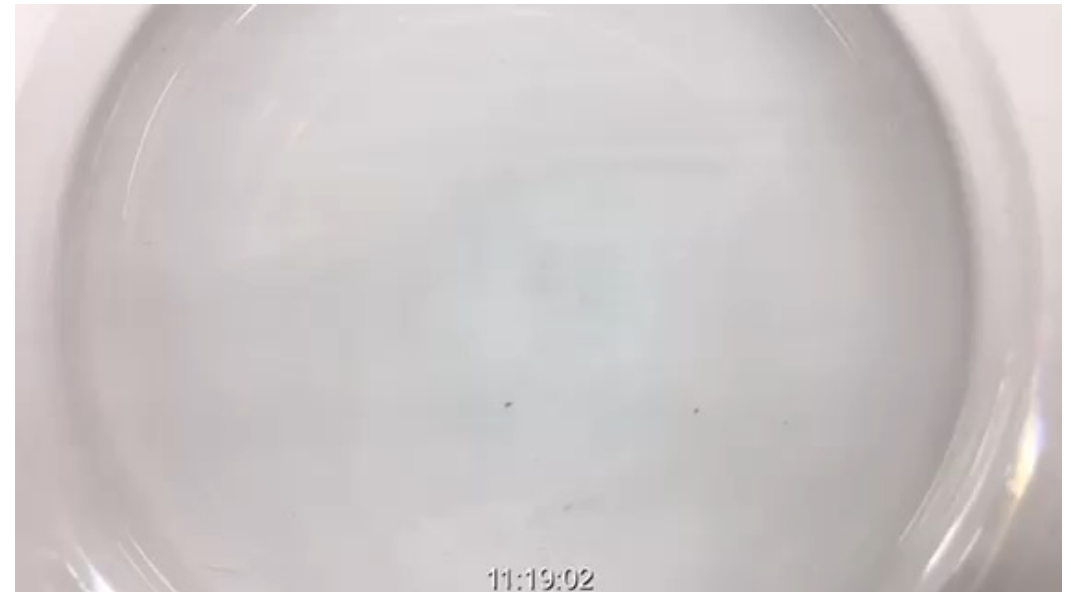
Blends well with most conventional dry fertilizer
SGN : 300
Bulk Density : 62.5 lbs/ft <sup>3</sup>
Angle of Repose : 32 Low
Salt Index : 17.8



# Size and Solubility are Key Features

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- Urea base with **Micronized particle size** allows for quick breakdown & conversion from elemental S to plant available S04
- Allows for seed row application where traditionally elemental Sulphur's required spreading applications to oxidize where Arctic S can be seed row and side band placed



## ARCTIC-S DISOLUTION/DISPERSION

Dispersion mechanism involves urea dissolving in water leaving clusters of sulphur particles which then 'crumble'

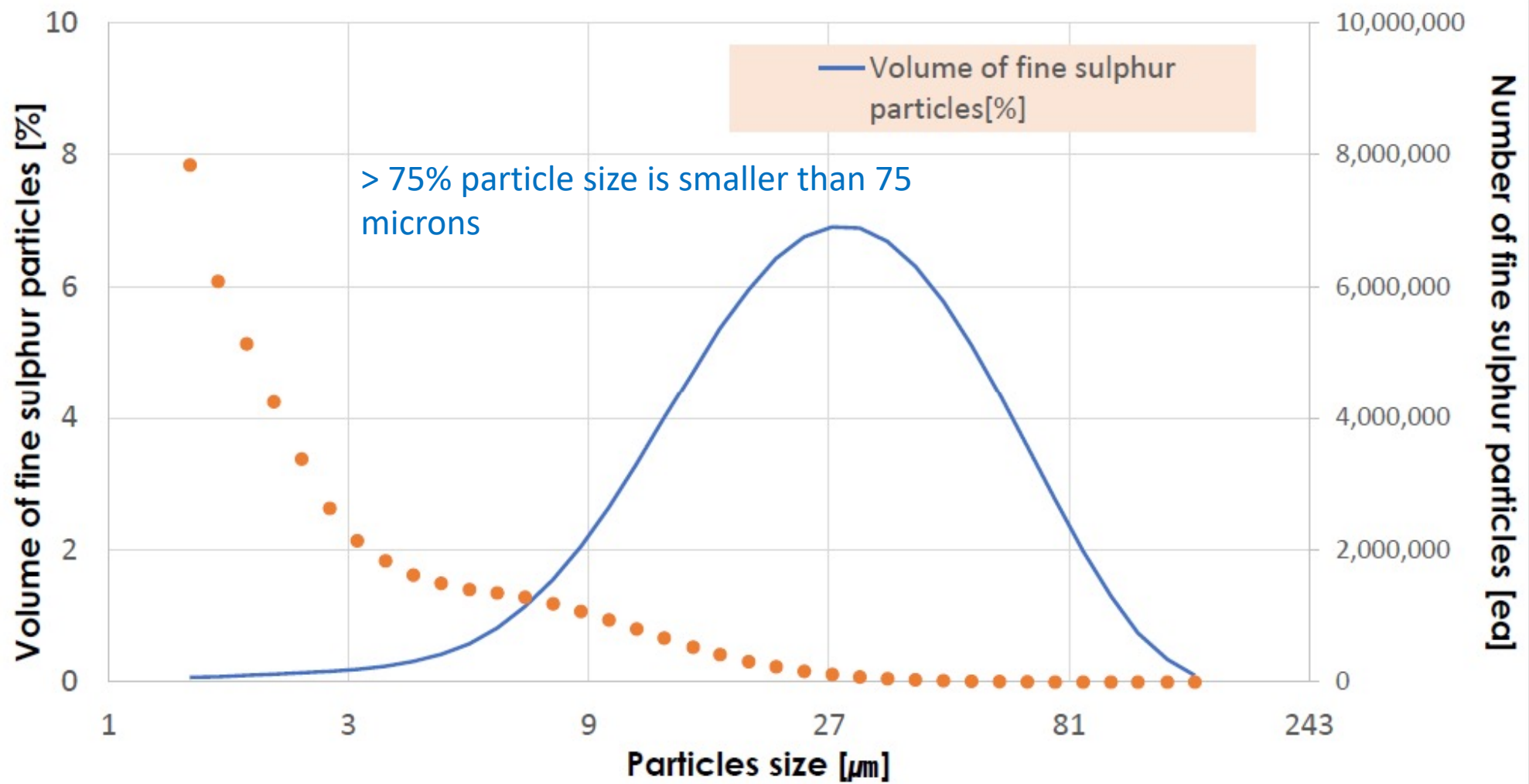
Timeframe: minutes (3-5)

## SULPHUR BENTONITE SWELLING/DISPERSION

Dispersion mechanism consist of the swelling clay expand, breaking the solid elemental sulphur matrix in small pieces

Timeframe: hours (24-48)







Particle Size (microns)	% S Oxidized	
	2 Weeks	4 Weeks
> 2,000	1	2
840 – 2,000	2	5
420 – 840	5	14
180 – 420	15	36
125 – 180	36	68
90 – 125	61	81
60	80	82

Canola.okstate.edu

	Micron Size Average
Arctic S	30-40um
Sulphur 90	200-300um
Human Hair	80um

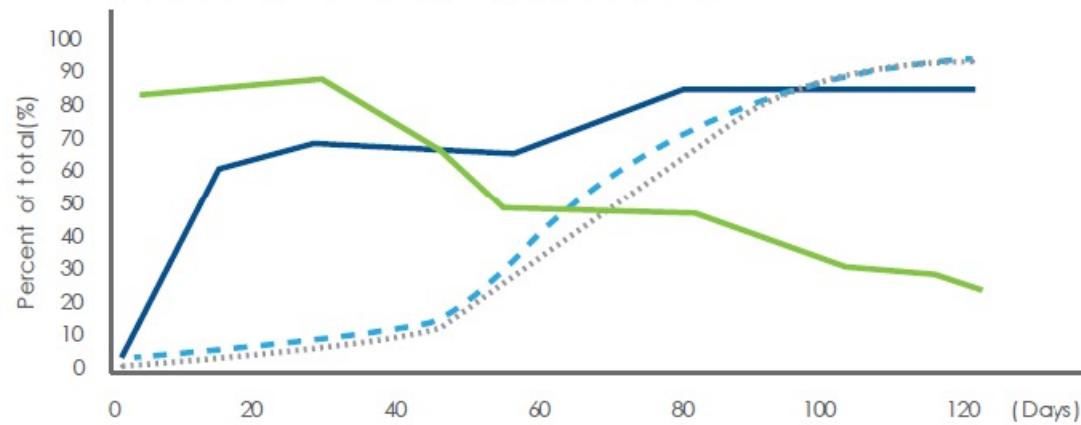
# TECHNICAL FEATURES

**Particle size** is key to the transition to sulphate

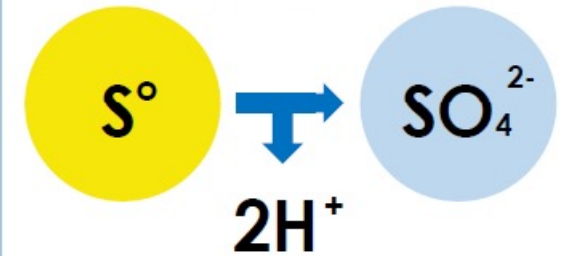
*Conversion rates are subject to the environmental and soil conditions*

## Arctic S Oxidation Compared with Crop Need

Measured Using PRS Probes, Crop Uptake Source IPNI



Oxygen + Water  
+ Microbial Activity





## CIRRUS TRIALS 2018 – Arctic S OXIDATION (Probe Test)

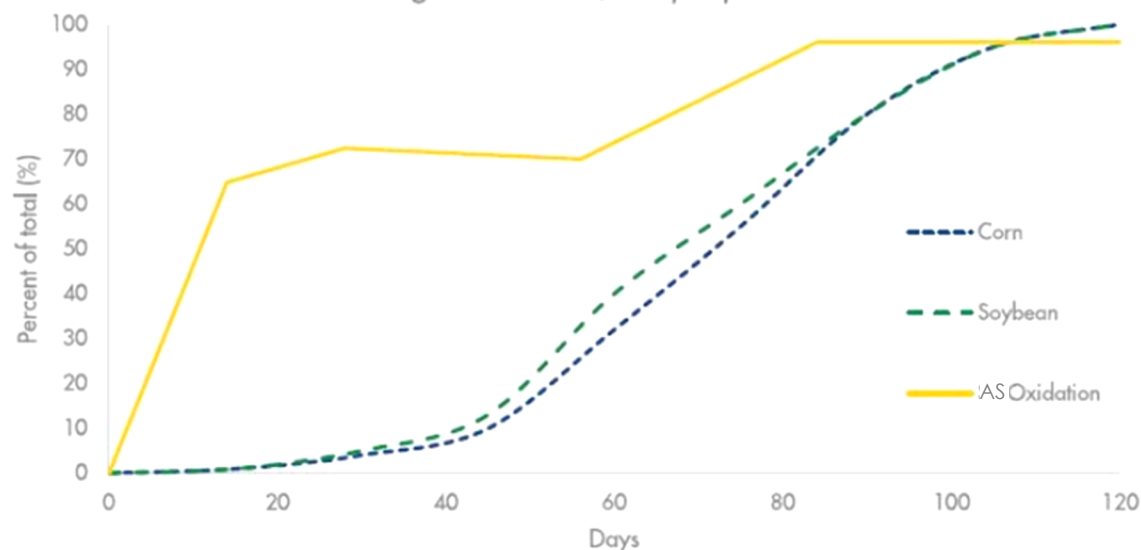
By applying elemental Sulphur in Micronized form, growers can access the in-season availability of a Sulphate product, while reducing the risk of losses through leaching.

**Delivering Sulphur when your crops need it most ensures you see a return on your fertilizer investment!**



### Arctic S Oxidation Compared with Crop Need

*Measured Using PRS Probes, Crop Uptake Source IPNI*



Oxidation test conducted in controlled environment to determine maximum oxidation potential of Arctic S. Variable climatic conditions in first 40 days would likely show Arctic S availability closer to uptake curves

## Sulphur deficient wheat





# Benefits Compared to Ammonium Sulphate Pt 1



Low salt index for safer seed placement  
eliminating or reducing chances of seed  
burn



Less plugging/caking of drills and floaters in  
humid conditions



Save time & money with less product to  
handle blend and ship. 1/3 to 1/2 the product  
to handle

# Benefits Compared to Ammonium Sulphate Pt2



Improved soil health & biological activity especially with repeated applications as thiobacillus and other soil health factors improve



Improved uptake of Phosphate by reducing P tie up in high PH or calcium rich soils



Lower acidity vs Ammonium sulphate prevents PH decreases and Mn toxicity



Provides a season long source of Sulphur with reduced leaching, beneficial in wet conditions





More flexibility in blends without the worry of caking



Improves storage space required for retailers freeing up bin space for other products and turns/sq. ft.



Better product availability in season with high-capacity plant in Saskatoon compared to AMS which is reliant on domestic and imported product

# Benefits Compared to Ammonium Sulphate Pt 3



High availability and efficiency of Arctic S technology may outweigh the added benefits of lower cost Sulphur bentonite  
\*Spring focus

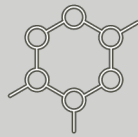


Very Safe high elemental product on the market  
-Self extinguishing material  
-Dust levels below minimum explosion levels of elemental



Can be blended easily with other products and soil applied (oxidization in soil)

# Benefits compared to Sulphur bentonite 90



Phosphate prills are often slow to breakdown resulting in the Sulphur portion being unavailable as well, compared to the urea based Arctic S prills which dissolve quickly



Customizable blend of MAP + Arctic S where P+S are in a fixed ration, often requiring Sulphur top ups for Canola



Improved margin and competitive per acre costs. Often a blend of Arctic S + MAP can be significant discount to P+S single prills

# Benefits compared to Phosphate + Sulphur fertilizers





\* In Canada Artic S is  
being handled 100% in  
bulk transport/blending



# ARCTIC HANDLING



# SAFETY FEATURES

Non-Hazardous Fertilizer as per OSHA

Strong prills create less potential dust compared to Sulphur bentonite that test at a fraction of minimum explosion limits

Self extinguishing material- Class 3 compared to Sulphur bentonite which is Class 5 which provides mitigated fire risk

Dust Hazard analysis available upon request



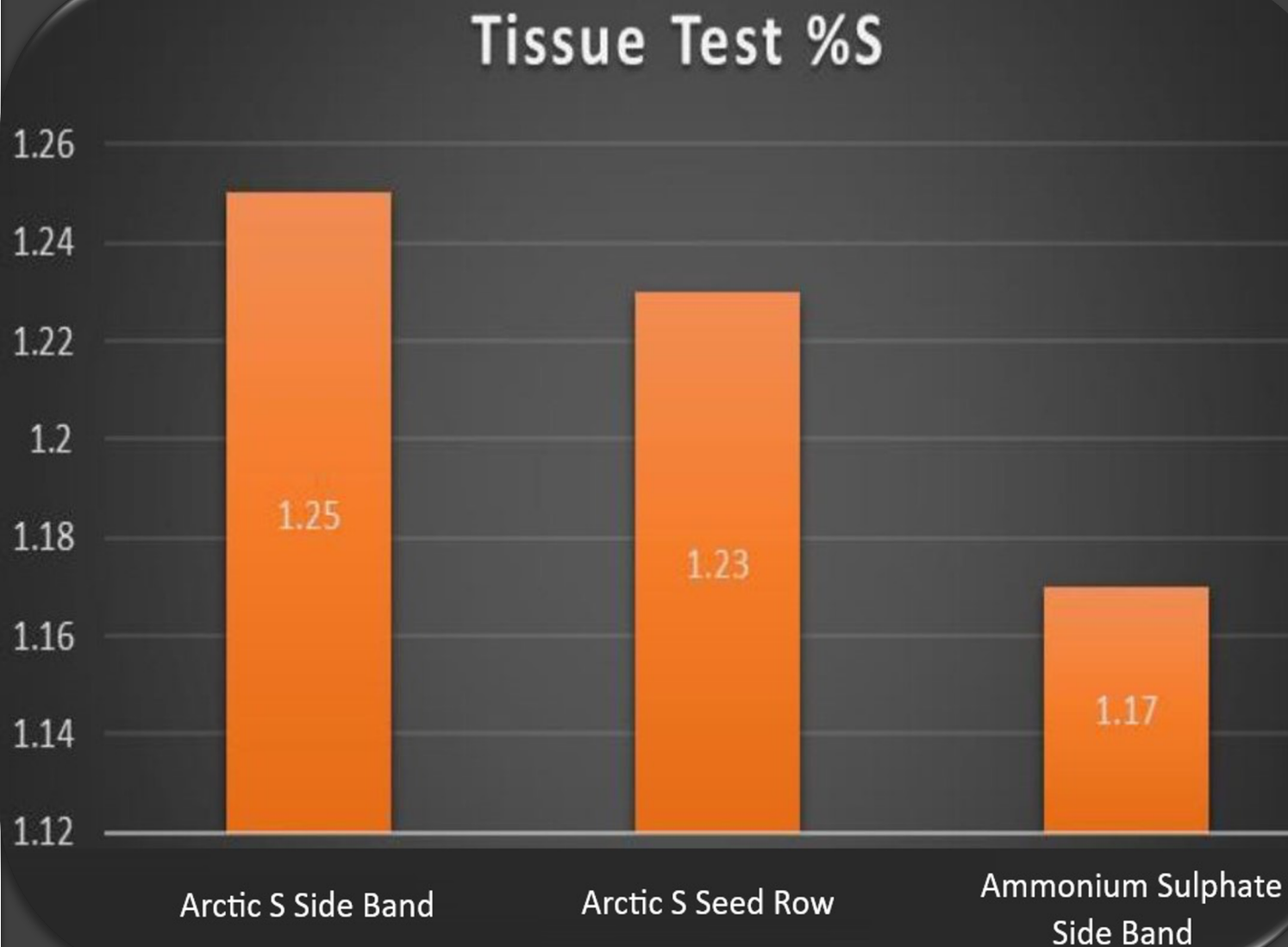


# EXCELLENT FOR BLENDS





# TISSUE RESULTS ICMS TRIALS 2018 SASKATOON



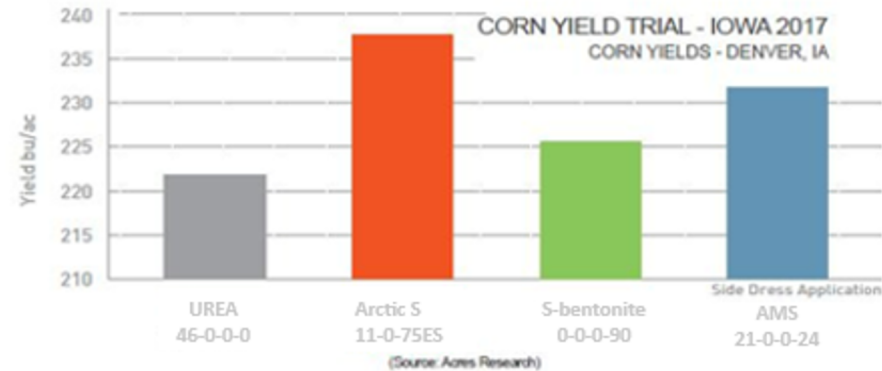


# CORN YIELD TRIALS 2017 IOWA, USA

## 4

### Increases Crop Yields

Continuous Sulphur supply increases crop yield



Soil Type : Loamy Fine Sand

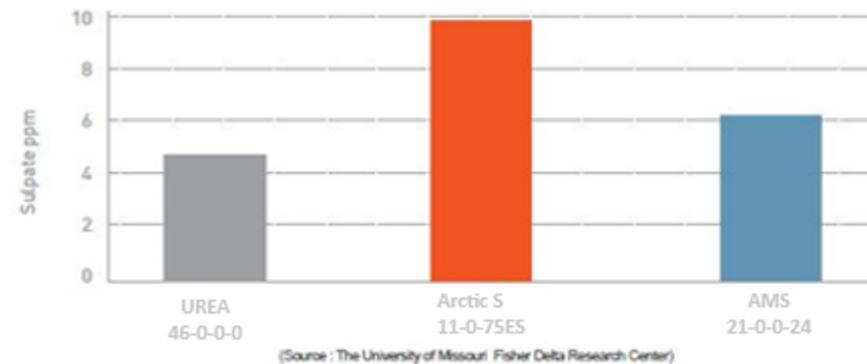
Treatments tested provide Sulphur requirement to crop. N,P,K and S rate were applied uniformly for all treatments and at the recommended rates for the region, the exception being a control treatment with no S:Urea.

## 5

### High Levels Of Residual Soil Sulphate After Harvest

Arctic S - Economical and Sustainable

Residual soil Sulphate levels post harvest combined with comparable yield results suggest sufficient oxidation for Super-S within the growing season, while offering residual benefits for future crops.



RESIDUAL SOIL SULPHATE  
levels POST HARVEST  
(Plant Sulphur Uptake Not Included)



# Customer Experience Retailer in Northern Saskatchewan Spring 2023

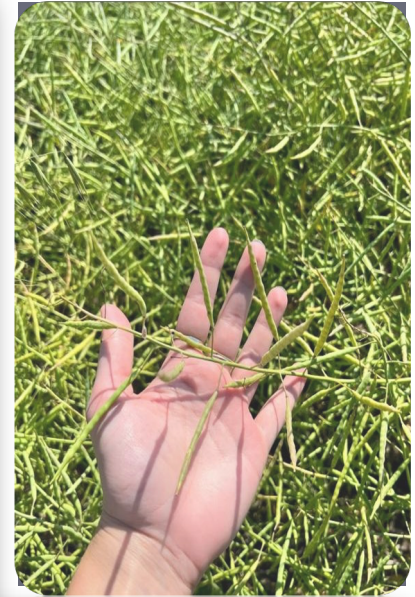
- Used 1000 tons of Arctic S as a cold turkey replacement to Ammonium sulphate, on over 80,000 acres
- Enjoyed only needing a single 160mt bin for Sulphur and the ability to have product available on a few hours' notice
- Retailer set up dozens of side by sides vs Ammonium sulphate
- Arctic S was consistently darker green cabbage with more cabbage mass
- Customer reordered 1,000mt in summer fill of 2023

*\*Farmer photo with **4 inches of rain** and first year use of Arctic S*



# Customer Experience Grower in Northern Saskatchewan Spring 2023

- 3<sup>rd</sup> year of using Arctic S
- Enjoys using 1/3 the product compared to AMS
- Believes the repeated use of **Arctic S** has led to improved yields compared to Ammonium sulphate users in his area with similar land and rainfall



Today 2:47 PM



That sulphur is paste 10min  
after hitting the ground

# Customer Experience Grower in Southern Saskatchewan Spring 2021

1<sup>st</sup> year applying elemental Sulphur, noticed product breaking down within minutes of application in the seed row in very dry conditions



# When & How to use Arctic S?

- Supplementing fields in Spring with previous application history of elemental
- Replacing ammonium sulphate fields with adequate fertilization history
- Spring Blended or broadcast with Urea, phosphate, potash as your sole source of Sulphur
- Blended with Ammonium sulphate or Amidas
- Strategies to implement from retailers over the last 4 years include:
  - Cold turkey switches from AMS in spring blends
  - First year all Sulphur in pulses in cereals with Arctic S and most of canola blends from Arctic S
  - Some Fall spreading annually with Super U or other Nitrogen for all crops
  - In season top dress alone, with Urea or with Urea and AMS



# When to consider a supplemental form of S with Arctic S?

- Field with zero residual Sulphur due to under application, for example Manitoba fields often apply only 12-15lbs during the canola rotation and no Sulphur in other rotations resulting in a major deficit of Sulphur over time. We would recommend supplementing with ammonium sulphate or ensuring a sufficient application rate of 30lbs/acre of Sulphur or higher and not in the mid row band in these conditions
- Fields with no fertilization history such as a converted hayfield
- Mid row banding any nutrients can result in nutrient deficiencies, application is recommended as broadcast, seed row, sideband

# Pricing

- Arctic S + Ammonia typically lower cost than Ammonium Sulphate
- Arctic S + Urea typically equal cost to Ammonium Sulphate
- Arctic S + MAP typically significantly less cost than P+S single prill products



# TESTIMONIALS

"WE ARE NOW ON OUR FIFTH SEASON OF USING ARCTIC S. THE LOW SALT INDEX AND HIGH S CONTENT ARE A PERFECT FIT FOR OUR GROWERS" ~  
MATT OWENS, EMERGE AG

"WE LIKED HANDLING LESS PRODUCT & OUR CANOLA IS PROBABLY THE BEST WE HAVE EVER SEEN ON THE FARM" ~ BRANDON SUNDQUIST, WATROUS, SK

"WE HAD A CUSTOMER WHOSE AMS BLENDS WERE CAUSING TROUBLES IN HIS DRILL THIS SPRING. AFTER SWITCHING HIS BLEND OVER TO ARCTIC S, ALL THE PROBLEMS WENT AWAY" ~ SASKATCHEWAN RETAILER

