ACTIVE™ AgriScience

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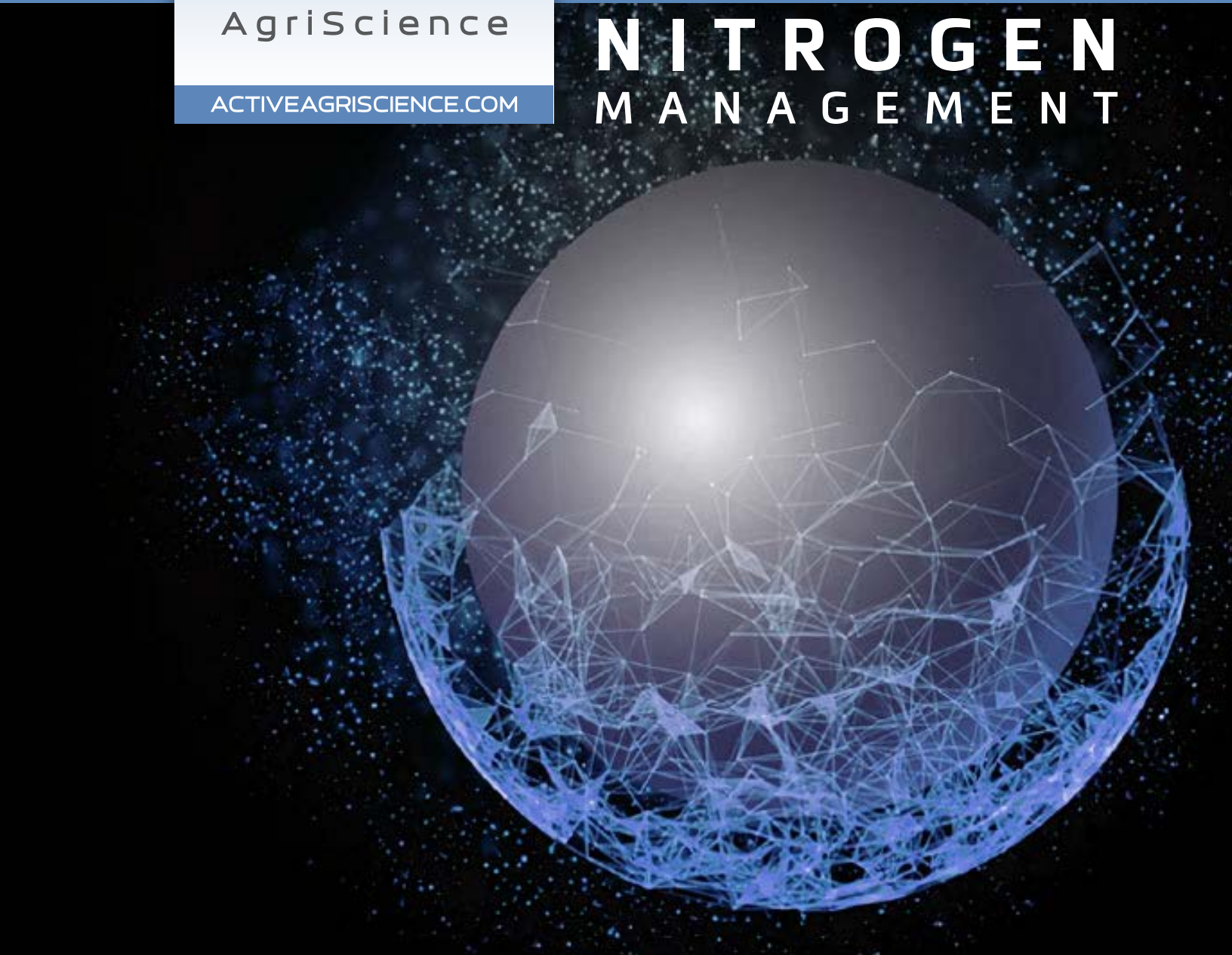
TECHNOLOGY BEYOND the POINT of NUTRITION™

PRODUCT GUIDE

NITROGEN MANAGEMENT



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ACTIVE™
AgriScience
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TECHNOLOGY BEYOND THE POINT OF NUTRITION™

Active AgriScience Inc. supports the farming community by providing innovative, effective and economical products. A leader in plant nutrient and bioactive compound research and technology, Active AgriScience uses rigorous scientific methods to develop full cycle fertilizer and nitrogen management solutions to help enhance crop potential while being mindful of environmental impacts.

INTRODUCTION

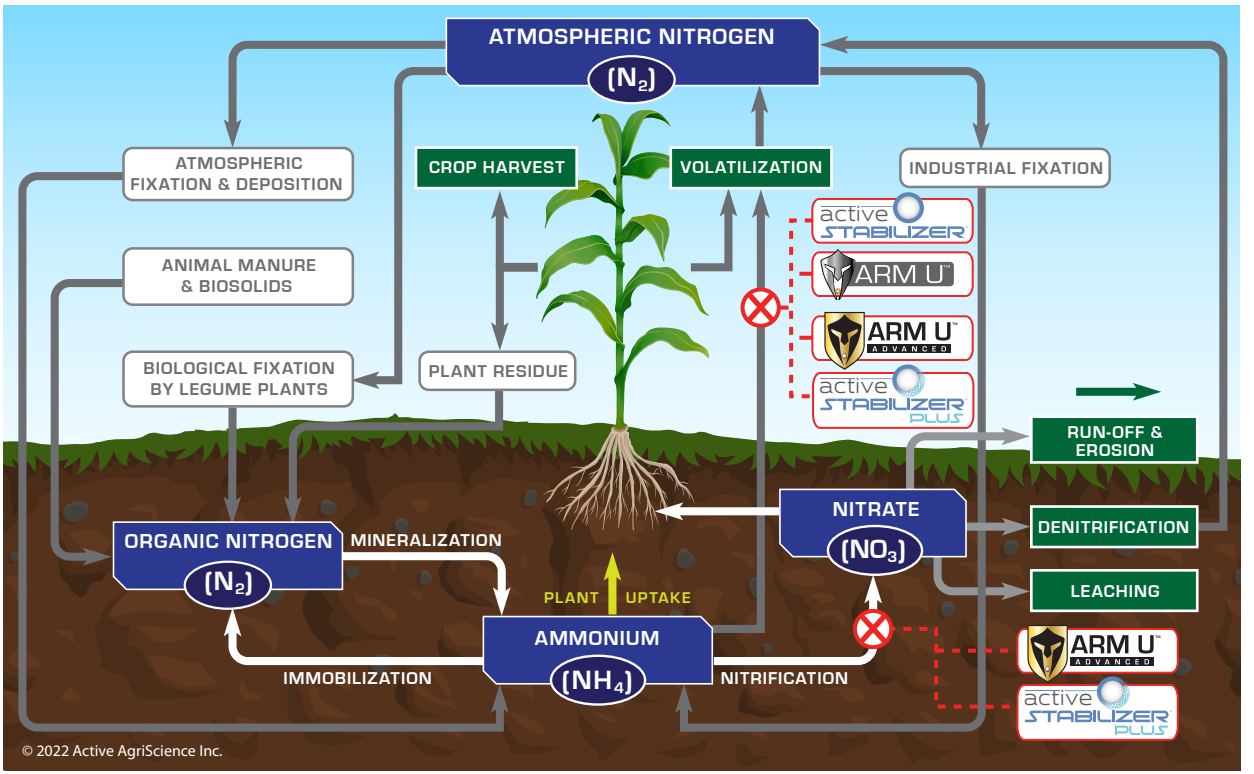
Nitrogen is essential for plant life and growth and is therefore a component of many fertilizers. Nitrogen loss is a challenge facing every grower when applying Urea or UAN in the spring or fall, regardless of the application method.

The risk of this nitrogen loss varies with:

- the type of Nitrogen
- soil type
- temperature
- management practices

Without any protective coating up to 50% of soil-applied Nitrogen is unavailable to the plant. Nitrogen can be converted quickly into ammonia gas through the process of ammonia volatilization and then released into the atmosphere. Nitrogen can also be lost in the soil through nitrification, the process of converting ammonium ions to less stable nitrate ions. Both of these mechanisms play a substantial role in the loss of valuable nitrogen.

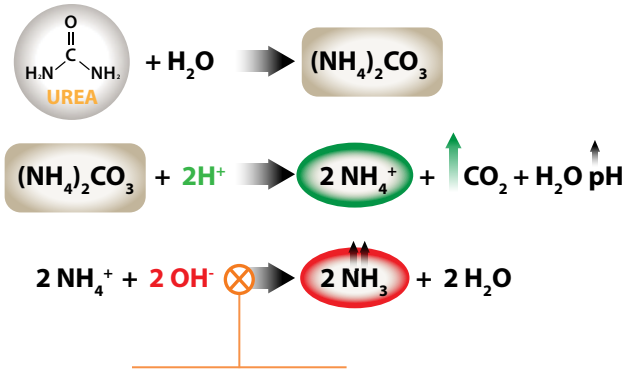
Understanding the Nitrogen cycle and the factors that can result in nitrogen loss are crucial to finding the right solution to this problem



Volatilization and nitrification are two processes that are responsible for Nitrogen loss.

VOLATILIZATION

Ammonia volatilization occurs during the hydrolysis of urea and is governed by the urease enzyme.



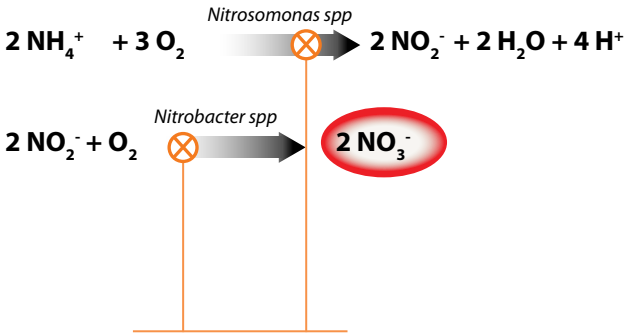
Coating urea with

ARM U™
ARM U™ ADVANCED
Active STABILIZER™
Active STABILIZER™ PLUS

reduces ammonia volatilization
by inhibiting urease enzyme activity.

NITRIFICATION

Nitrate is formed by the oxidation of ammonium in the presence of Nitrosomonas & Nitrobacter bacteria.



Coating urea with

ARM U™ ADVANCED
Active STABILIZER™ PLUS

inhibits nitrification
by inhibiting Nitrosomonas and Nitrobacter bacterial activity.

BENEFITS of ARM U™

ARM U™ is an NBPT soil fertilizer additive that allows plants to absorb and utilize nitrogen that would otherwise disappear too quickly through the conversion to ammonia gas. Give your crop the opportunity to flourish with the nitrogen it needs for healthy, rapid growth.

- **INCREASED NBPT EFFICACY AND EFFICIENCY**
  (stabilized & buffering capacity)
- **THOROUGH COVERAGE AND COATING AGENT**
  (spreader molecules)
- **ACTS AS A DUST CONTROL AGENT**
- **STAYS IN LIQUID FORM UP TO -15ºC,**
  (making it easy to handle and store in cooler conditions)
- **FORMULATED AND MANUFACTURED FOR COLDER ENVIRONMENTS WITH LOW RAINFALL**

Patent numbers: USA: 9422203 B2; Canada: 2889430

Active ingredient: 18% N-(n-butyl) thiophosphoric triamide (NBPT), CAS No. 94317-64-3.
Total inactive ingredients: 82 % (preservative, colorant, spreading agents, surfactant).

ARM U™ ADVANCED is an NBPT and DMPP based fertilizer additive that utilizes two mechanisms to ensure that plants are able to absorb sufficient nitrogen. It inhibits ammonia volatilization and nitrification by inhibiting the activity of urease enzymes as well as nitrosomonas and nitrobacter bacteria in the soil.

- **DUAL NITROGEN SAVING TECHNOLOGY**
  (addresses ammonia volatilization, nitrification and denitrificiation)
- **LIQUID FORMULATION TO CONTROL AMMONIA VOLATILIZATION & NITRIFICATION**
- **CORRECT RATIO OF UREASE TO NITRIFICATION INHIBITOR** (4:1 ratio)
- **INCREASED NBPT EFFICACY AND EFFICIENCY**
  (stabilized & buffering capacity)
- **THOROUGH COVERAGE AND COATING AGENT**
  (spreader molecules)
- **ACTS AS A DUST CONTROL AGENT**
- **STAYS IN LIQUID FORM UP TO -15ºC,**
  (making it easy to handle and store in cooler conditions)

Patent Pending.
ARM U™ Advanced consists of two parts: 1) Part A 2) Part B
PART A - Active ingredients: 30% NBPT (N-(n-butyl) thiophosphoric triamide) CAS No. 94317-64-3
Total inactive Ingredients: (70%) NMP (N-methyl-2-pyrrolidone) CAS No. 872-50-4, propylene glycol CAS No. 57-55-6, ethylene glycol CAS No. 107-21-1, emulsifier, perservative, dye.
PART B - Active Ingredients: 15% DMPP (3, 4-dimethylpyrazole phosphate), CAS No. 202842-98-6
Total inactive ingredients: (85%) NMP (N-methyl-2-pyrrolidone) CAS No. 872-50-4, propylene glycol CAS No. 57-55-6, emulsifier, preservative, dye.

BENEFITS of ACTIVE STABILIZER™

Active STABILIZER™ helps prevent nitrogen loss through ammonia volatilization ensuring applied fertilizer is not wasted. With its low cost and unique variable application rate farmers can treat as necessary to maximize their return on investment.

ECONOMICAL CHOICE
(treatment can pay for itself)

VARIABLE APPLICATION RATE
(1.2-2.4L/metric tonne of Urea)

INCREASED NBPT EFFICACY AND EFFICIENCY
(stabilized and buffering capacity)

THOROUGH COVERAGE AND COATING AGENT
(spreader molecules)

ACTS AS A DUST CONTROL AGENT

STAYS IN LIQUID FORM UP TO -15ºC
(making it easy to handle and store in cooler conditions)

FORMULATED AND MANUFACTURED FOR COLDER ENVIRONMENTS WITH LOW RAINFALL

Patent numbers: USA: 9422203 B2; Canada: 2889430

Active ingredients: 12% N-(n-butyl) thiophosphoric triamide (NBPT) CAS No. 94317-64-3.
Total inactive ingredients: (88%) NMP (N-methyl-2-pyrrolidone) CAS No. 872-50-4, propylene glycol CAS No. 57-55-6, emulsifier, preservative, dye.

BENEFITS of ACTIVE STABILIZER™ PLUS

Active STABILIZER™ PLUS helps prevent nitrogen loss due to ammonia volatilization, nitrification and denitrification processes ensuring applied fertilizer is not wasted. In comparison to DCD products, the DMPP in Active STABILIZER™ PLUS offers superior efficacy and no bio-accumulation.

- **ECONOMICAL CHOICE**
  (treatment can pay for itself)
- **VARIABLE APPLICATION RATE**
  (making it easy to handle and store in cooler conditions)
- **DUAL NITROGEN SAVING TECHNOLOGY**
  (addresses ammonia volatilization, nitrification and denitrificiation)
- **LIQUID FORMULATION TO CONTROL AMMONIA VOLATILIZATION & NITRIFICATION**
- **CORRECT RATIO OF UREASE TO NITRIFICATION INHIBITOR** (4:1 ratio)
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  (stabilized & buffering capacity)
- **THOROUGH COVERAGE AND COATING AGENT**
  (spreader molecules)
- **ACTS AS A DUST CONTROL AGENT**
- **STAYS IN LIQUID FORM UP TO -15ºC,**
  (making it easy to handle and store in cooler conditions)

Patent Pending.

Active ingredients: 12% NBPT (N-(n-butyl) thiophosphoric triamide) CAS No. 94317-64-3; 2% DMPP (3,4-dimethylpyrazole phosphate) CAS No. 202842-98-6.
Total inactive ingredients: (86%) NMP (N-methyl-2-pyrrolidone) CAS No. 872-50-4, propylene glycol CAS No. 57-55-6, emulsifier, preservative, dye.

PRODUCT COMPARISON

ARM U	ARM U ADVANCED
18% NBPT	30% NBPT
No DMPP	15% DMPP
One product	Two parts
2L/MT of urea	1.8L/MT of urea
Address ammonia volatilization	Address ammonia volatilization, nitrification, denitrification, leaching, runoff
Colder environments / Low rainfall	Longer N preservation / leaching / runoff

ACTIVE STABILIZER	ACTIVE STABILIZER PLUS
12% NBPT	12% NBPT
No DMPP	2% DMPP
One product	One product
1.2-2.4L/MT of urea	1.2-2.4L/MT of urea
Address ammonia volatilization	Address ammonia volatilization, nitrification, denitrification, leaching, runoff
Colder environments / Low rainfall	Longer N preservation / leaching / runoff

ARM U™ BLENDING INSTRUCTIONS:

READ THE ENTIRE LABEL BEFORE USING THIS PRODUCT.

Blending into UAN: Use 1.2 L ARM U™/ 1000 kg UAN solution. Fill spray tank with half the desired amount of UAN, Measure the recommended quantity of Arm U™ and add to the tank. Mix well. Add other products at this stage, if needed. Add the second half of the UAN solution. Continue mixing until well blended. Keep agitator running while mixing.

Blending into UREA: Use 2 L ARM U™/1000 kg Urea. For uniform blending, use a blender with impregnation equipment. Weigh the urea and transfer to blender. Add the required amount of ARM U to the urea in the blender. Blend until the ARM U™ is uniformly mixed into the urea. Do not add any other fertilizer materials until ARM U™ is thoroughly distributed. If mixture appears wet or sticky, a drying agent may be added at this time.

ARM U™ ADVANCED BLENDING INSTRUCTIONS:

READ THE ENTIRE LABEL BEFORE USING THIS PRODUCT.

Preparation Instructions: Use Part A & Part B in a 1: 0.5 ratio by volume. Premixing - Pour Part B into Part A. Mixing is not required; however, if mixing equipment is available, agitate mixture for 1-2 minutes. Use prepared mixture immediately – do not store. Treating System - Direct Part A and Part B toward the fertilizer in a 1: 0.5 ratio.

Blending into UAN: Use 1.1 L ARM U™ ADVANCED / 1000 kg UAN solution. Fill spray tank with half the desired amount of UAN, Measure the recommended quantity of Arm U™ ADVANCED and add to the tank. Mix well. Add other products at this stage, if needed. Add the second half of the UAN solution. Continue mixing until well blended.

Blending into UREA: Use 1.8 L ARM U™ ADVANCED / 1000 kg Urea. For uniform blending, use a blender with impregnation equipment. Weigh the urea and transfer to blender. Add the required amount of ARM U™ ADVANCED to the urea in the blender. Blend until the ARM U™ ADVANCED is uniformly mixed into the urea. Do not add any other fertilizer materials until ARM U™ ADVANCED is thoroughly distributed. If mixture appears wet or sticky, a drying agent may be added at this time.

ACTIVE STABILIZER™ BLENDING INSTRUCTIONS:

READ THE ENTIRE LABEL BEFORE USING THIS PRODUCT.

Blending into UAN: Use 1 - 2 L Active STABILIZER™/ 1000 kg UAN solution. Fill spray tank with half the desired amount of UAN, Measure the recommended quantity of Active STABILIZER™ and add to the tank. Mix well. Add other products at this stage, if needed. Add the second half of the UAN solution. Continue mixing until well blended. Keep agitator running while mixing.

Blending into UREA: Use 1.2 - 2.4 L Active STABILIZER™/1000 kg Urea. For uniform blending, use a blender with impregnation equipment. Weigh the urea and transfer to blender. Add the required amount of Active STABILIZER to the urea in the blender. Blend until the Active STABILIZER™ is uniformly mixed into the urea. Do not add any other fertilizer material until Active STABILIZER™ is thoroughly distributed. If mixture appears wet or sticky, a drying agent may be added at this time.

ACTIVE STABILIZER™ PLUS BLENDING INSTRUCTIONS:

READ THE ENTIRE LABEL BEFORE USING THIS PRODUCT.

Blending into UAN: Use 1 - 2 L of Active STABILIZER™ PLUS / 1000 kg UAN solution. Fill spray tank with half the desired amount of UAN, Measure the recommended quantity of Active STABILIZER™ PLUS and add to the tank. Mix well. Add other products at this stage, if needed. Add the second half of the UAN solution. Continue mixing until well blended. Keep agitator running while mixing.

Blending into UREA: Use 1.2 - 2.4 L Active STABILIZER™ PLUS / 1000 kg Urea. For uniform blending, use a blender with impregnation equipment. Weigh the urea and transfer to blender. Add the required amount of Active STABILIZER™ PLUS to the urea in the blender. Blend until the Active STABILIZER™ PLUS is uniformly mixed into the urea. Do not add any other fertilizer materials until Active STABILIZER™ PLUS is thoroughly distributed. If mixture appears wet or sticky, a drying agent may be added at this time.

APPLICATION RATE STUDY - ARM U™, ARM U™ ADVANCED (UOM*/UOW**)

Treatment	Dry matter yield, g pot^{-1}	N uptake, mg pot^{-1}	P uptake, mg pot^{-1}	NUE, %***
Urea+ ARM U™ (2L/1000kg)	5.6 a	60.1 abc	7.6 ab	38 abc
UAN+ ARM U™ (1L/1000kg)	5.6 a	65.1 a	8.2 a	44 a
Urea+ARM U™ ADVANCED (1L/1000kg)	5.1 a	54.6 cd	7.4 ab	32 cd
Urea+ARM U™ ADVANCED (1.5L/1000kg)	5.5. a	56.3 bed	7.6 ab	34 bcd
Urea+ARM U™ ADVANCED (2L/1000kg)	5.4 a	55.5 bcd	7.4 ab	33 bcd
UAN+ARM U™ ADVANCED (1L/1000kg)	5.4 a	62.5 ab	6.8 bc	41 ab
UAN+ARM U™ ADVANCED (2L/1000kg)	5.3 a	65.6 a	8.0 ab	45 a
Untreated urea	4.8 a	50.8 d	7.8 ab	27 d
Untreated UAN	5.3 a	57.6 bcd	8.7 a	35 bcd
No N fertilizer	3.1 b	27.9 e	5.9 c	—

ARM U™/ARM U™ Advanced in a measuring container for treating

Application of ARM U™/ARM U™ Advanced onto moving belt of urea

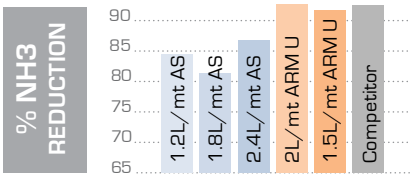
Blending ARM U™/ARM U™ Advanced into urea using vertical screw auger fed from bottom conveyor

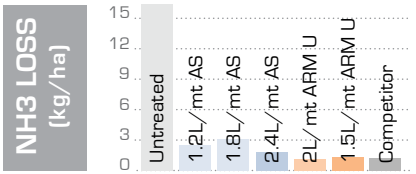
Based on this research application rate for ARM U™ is 2L/MT of urea and ARM U™ ADVANCED is 1.5L/MT of urea.

* UOM-University of Manitoba; ** UOW-University of Winnipeg; ***Nitrogen Use Efficiency

UREASE INHIBITORS

BANDED UREA • 3rd Party Research by the University of Manitoba

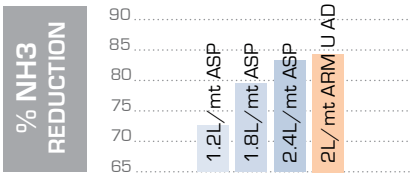


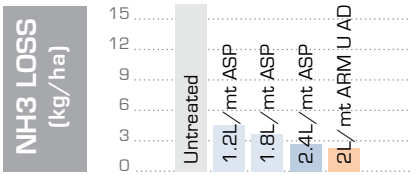


TREATMENTS	BANDED	
	NH3 loss (kg/ha)	% NH3 reduction
Untreated Urea	16.6	0.0
1.2L/mt Active STABILIZER (12% NBPT)	2.6	84.4
1.8L/mt Active STABILIZER (12% NBPT)	3.0	82.0
2.4L/mt Active STABILIZER (12% NBPT)	2.0	87.7
2L/mt ARM U (18% NBPT)	1.1	93.1
1.5L/mt ARM U (30% NBPT)	1.3	92.3
2.1L/mt Competitor (30% NBPT)	1.1	93.1

DUAL INHIBITORS

BANDED UREA • 3rd Party Research by the University of Manitoba

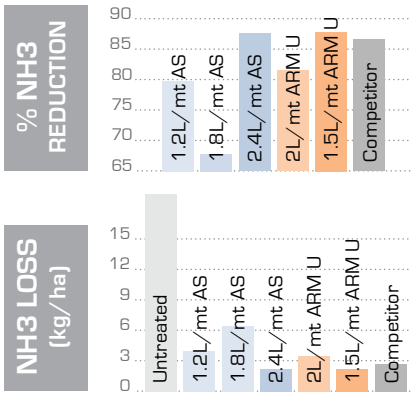




TREATMENTS	BANDED	
	NH3 loss (kg/ha)	% NH3 reduction
Untreated Urea	16.6	0.0
1.2L/mt Active STABILIZER PLUS (12% NBPT, 2% DMPP)	4.6	72.5
1.8L/mt Active STABILIZER PLUS (12% NBPT, 2% DMPP)	3.4	79.4
2.4L/mt Active STABILIZER PLUS (12% NBPT, 2% DMPP)	2.7	83.8
2L/mt ARM U Advanced (30% NBPT, 15% DMPP)	2.6	84.5

UREASE INHIBITORS

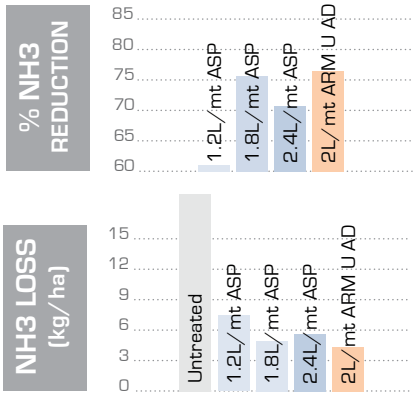
BROADCASTED UREA • 3rd Party Research by the University of Manitoba



TREATMENTS	BROADCAST	
	NH3 loss (kg/ha)	% NH3 reduction
Untreated Urea	19.2	0.0
1.2L/mt Active STABILIZER (12% NBPT)	3.9	79.6
1.8L/mt Active STABILIZER (12% NBPT)	6.2	67.6
2.4L/mt Active STABILIZER (12% NBPT)	2.4	87.4
2L/mt ARM U (18% NBPT)	3.4	82.4
1.5L/mt ARM U (30% NBPT)	2.4	87.6
2.1L/mt Competitor (30% NBPT)	2.7	86.2

DUAL INHIBITORS

BROADCASTED UREA • 3rd Party Research by the University of Manitoba



TREATMENTS	BROADCAST	
	NH3 loss (kg/ha)	% NH3 reduction
Untreated Urea	19.2	0.0
1.2L/mt Active STABILIZER PLUS (12% NBPT, 2% DMPP)	7.4	61.5
1.8L/mt Active STABILIZER PLUS (12% NBPT, 2% DMPP)	4.8	75.2
2.4L/mt Active STABILIZER PLUS (12% NBPT, 2% DMPP)	5.7	70.3
2L/mt ARM U Advanced (30% NBPT, 15% DMPP)	4.5	76.5

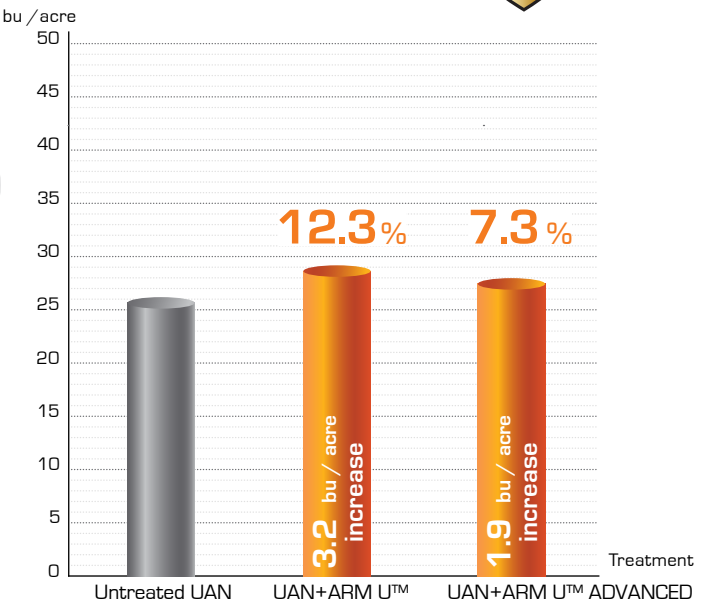
CANOLA • CARMAN EAST MANITOBA
Spring applied UAN + ARM U™ and UAN + ARM U™ ADVANCED

Cumulative ammonia volatilization losses (% of applied N) and Yield

Treatment	Total NH3 loss (kg N/ha)	% reduction	Yield (bu/acre)	% change
Untreated UAN @ 75 kg N/ha	4.0		26.1	
UAN+ ARM U™ @ 75 kg N/ha	4.2	-5	29.3	12.3
UAN + ARM U™ ADVANCED @ 75 kg N/ha	1.2	70	28.0	7.3

Third-party research conducted by the University of Manitoba

ARM U™ ARM U™ ADVANCED

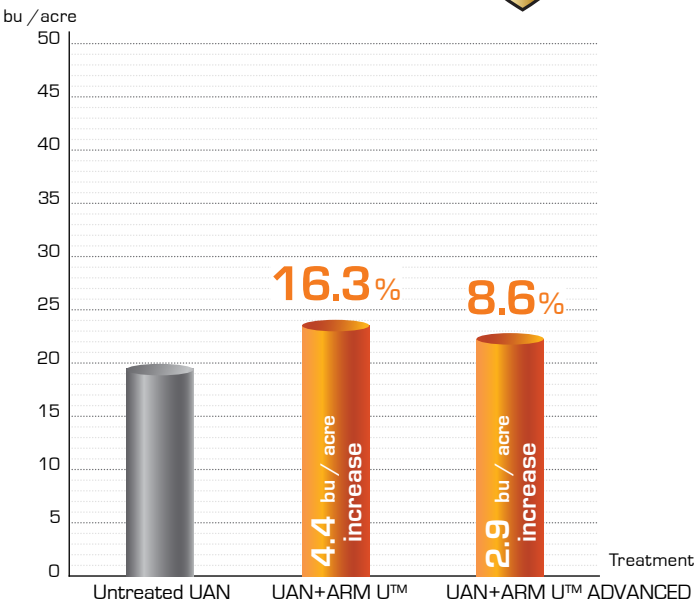


CANOLA • CARMAN EAST MANITOBA
Fall applied UAN+ ARM U™ and UAN + ARM U™ ADVANCED

Cumulative ammonia volatilization losses (% of applied N) and Yield

Treatment	Total NH3 loss (kg N/ha)	% reduction	Yield (bu/acre)	% change
Untreated UAN @ 75 kg N/ha	6.5		19.9	
UAN + ARM U™ @ 75 kg N/ha	1.2	81	24.3	16.3
UAN + ARM U™ ADVANCED @ 75 kg N/ha	3.2	51	22.7	8.6

Third-party research conducted by the University of Manitoba

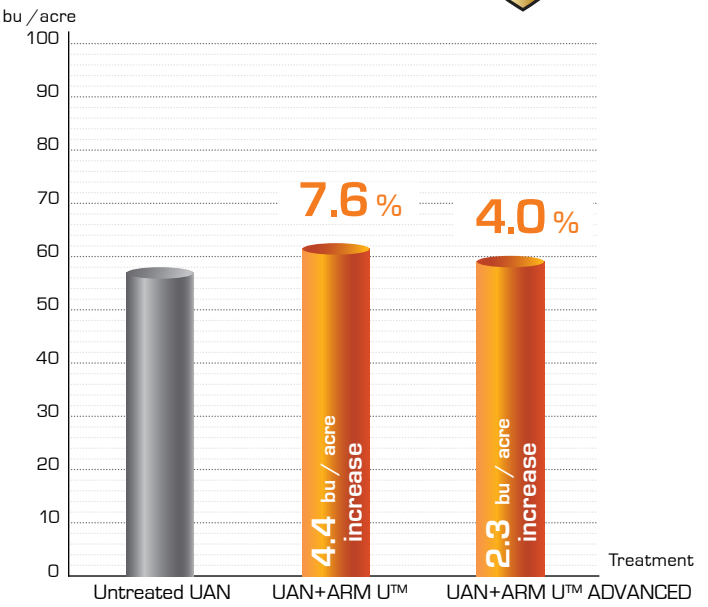


WHEAT • PORTAGE WEST MANITOBA
Spring applied UAN + ARM U™ and UAN + ARM U™ ADVANCED

Cumulative ammonia volatilization losses (% of applied N) and Yield

Treatment	Total NH3 loss (kg N/ha)	% reduction	Yield (bu/acre)	% change
Untreated UAN @ 75 kg N/ha	8.1		58.0	
UAN + ARM U™ @ 75 kg N/ha	5.6	31	62.4	7.6
UAN + ARM U™ ADVANCED @ 75 kg N/ha	6.5	20	60.3	4.0

Third-party research conducted by the University of Manitoba



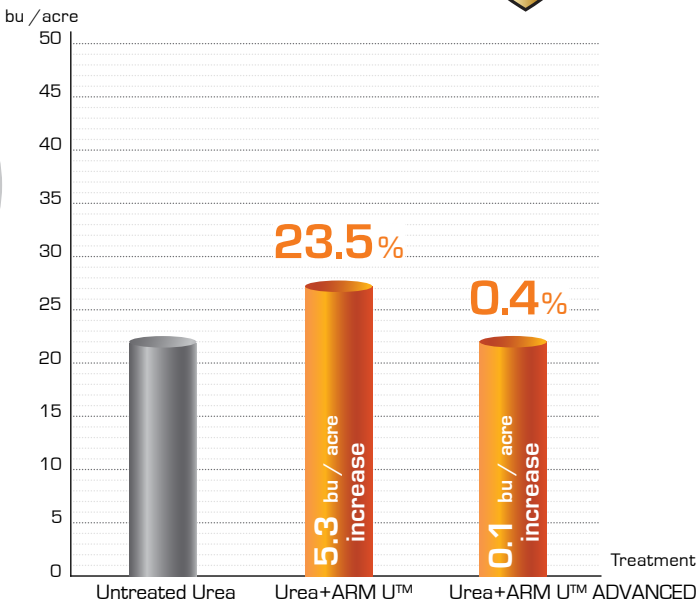
CANOLA • PORTAGE EAST MANITOBA
Fall applied Urea + ARM U™ and Urea + ARM U™ ADVANCED

Cumulative ammonia volatilization losses (% of applied N) and Yield

Treatment	Total NH3 loss (kg N/ha)	% reduction	Yield (bu/acre)	% change
Untreated Urea @ 75 kg N/ha	15.1		22.5	
Urea + ARM U™ @ 75 kg N/ha	2.9	81	27.8	23.5
Urea + ARM U™ ADVANCED @ 75 kg N/ha	3.1	79	22.6	0.4

Third-party research conducted by the University of Manitoba

ARM U™ ARM U™ ADVANCED

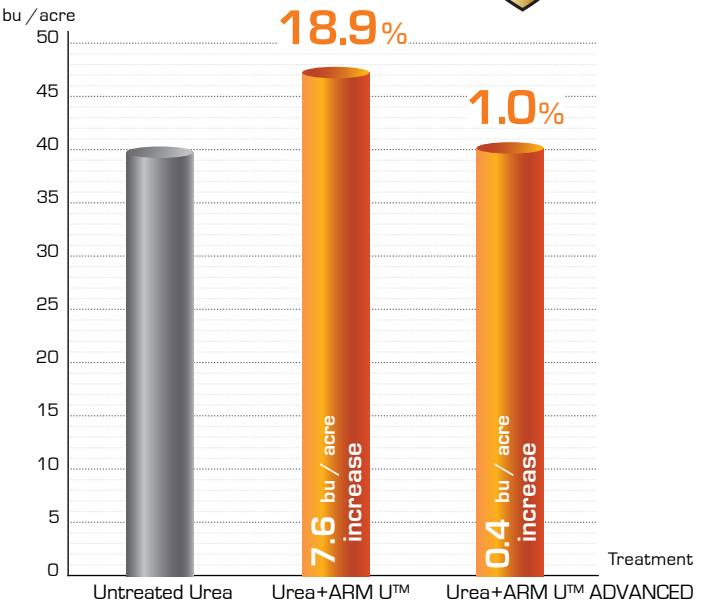


WHEAT • CARMAN WEST MANITOBA
Spring applied Urea + ARM U™ and Urea + ARM U™ ADVANCED

Cumulative ammonia volatilization losses (% of applied N) and Yield

Treatment	Total NH3 loss (kg N/ha)	% reduction	Yield (bu/acre)	% change
Untreated Urea @ 75 kg N/ha	6.9		40.3	
Urea + ARM U™ @ 75 kg N/ha	2.4	65	47.9	18.9
Urea + ARM U™ ADVANCED @ 75 kg N/ha	5.1	26	40.7	1.0

Third-party research conducted by the University of Manitoba

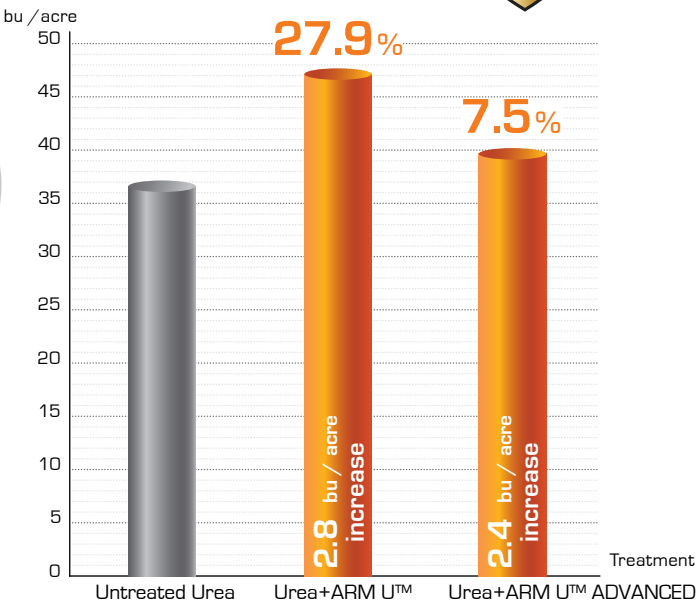


WHEAT • CARMAN WEST MANITOBA
Fall applied Urea + ARM U™ and Urea + ARM U™ ADVANCED

Cumulative ammonia volatilization losses (% of applied N) and Yield

Treatment	Total NH3 loss (kg N/ha)	% reduction	Yield (bu/acre)	% change
Untreated Urea @ 75 kg N/ha	15.5		37.3	
Urea+ ARM U™ @ 75 kg N/ha	2.8	82	47.7	27.9
Urea + ARM U™ ADVANCED @ 75 kg N/ha	1.0	93	40.1	7.5

Third-party research conducted by the University of Manitoba



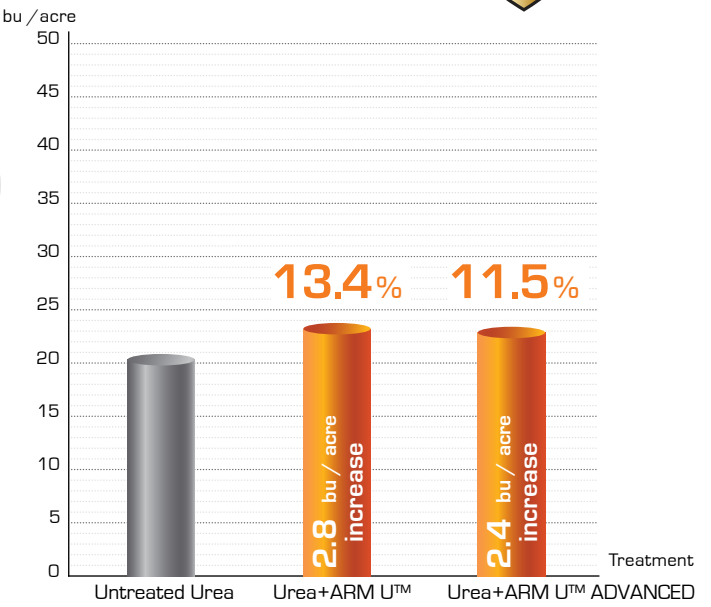
CANOLA • CARMAN EAST MANITOBA
Fall applied Urea + ARM U™ and Urea + ARM U™ ADVANCED

Cumulative ammonia volatilization losses (% of applied N) and Yield

Treatment	Total NH3 loss (kg N/ha)	% reduction	Yield (bu/acre)	% change
Untreated Urea @ 75 kg N/ha	16.6		20.9	
Urea+ ARM U™ @ 75 kg N/ha	9.3	44	23.7	13.4
Urea + ARM U™ ADVANCED @ 75 kg N/ha	5.4	67	23.3	11.5

Third-party research conducted by the University of Manitoba

ARM U™ ADVANCED

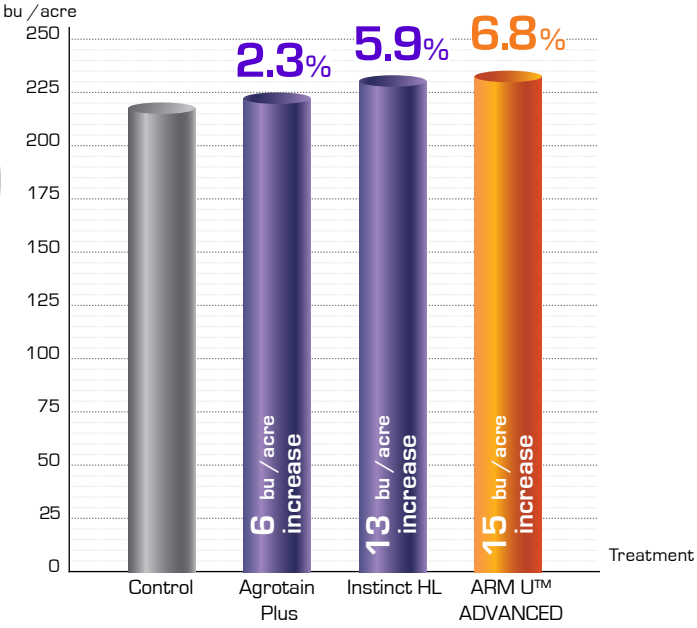


CANOLA • COMPETITOR COMPARISON 2017

Dual nitrogen saving technologies compared to ARM U™ ADVANCED

Treatment	Yield (bu/acre)	Bu/acre difference	% change
Untreated	220		
Agrotain Plus @ 168 kg N/ha	225	6	2.3
Instinct HL @ 168 kg N/ha	233	13	5.9
ARM U™ ADVANCED @ 168 kg N/ha	235	15	6.8

Third-party research conducted by United Prairie, IL.

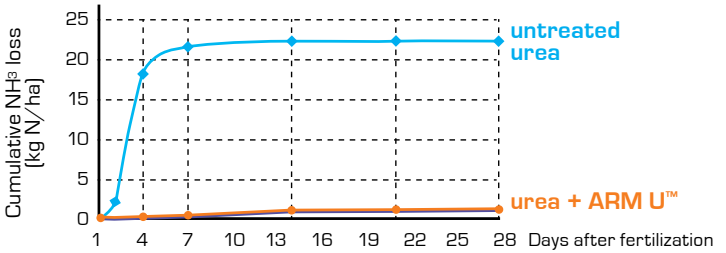


2017 VOLATILIZATION DATA

Cumulative Ammonia Volatilization (kg/ha) - UOM**/UOW**

Treatment	Day 1	Day 2	Day 4	Day 7	Day 14	Day 21	Day 28	% Control
Untreated Urea	0.11a	2.33a	18.46a	21.83a	22.53a	22.56a	22.57a	
Urea+ARM U™ - 2L/Mt	0.03b	0.07b	0.19b	0.35b	0.79b	0.93b	0.96b	96
Urea+ARM U™ - 3L/Mt	0.03b	0.06b	0.15b	0.26b	0.57b	0.69b	0.73b	97
Urea+Competitor 1 - 2L/Mt	0.03b	0.06b	0.17b	0.32b	0.74b	0.86b	0.88b	96
Urea+Competitor 2 - 2L/Mt	0.04b	0.09b	0.22b	0.42b	1.06	1.18b	1.21b	95

Cumulative ammonia volatilization



Shelflife Study - 2017 Volatilization Data (UOM**/UOW**)*

Arm U treated urea has minimum one year shelflife

Treatments	TRT	Day 2	Day 4	Day 7	Day 14	Day 21 (Total)	% reduction	kg of N saved/ha
ARM U™ UREA – April 2016	T1	0.6	1.4	2.0	3.8	4.3	87.3	28.8
ARM U™ UREA – October 2016	T2	1.7	2.6	4.1	8.5	9.0	73.2	24.2
ARM U™ UREA – January 2017	T3	0.8	1.4	2.1	5.5	6.3	81.1	26.8
ARM U™ UREA – Fresh (April 2017)	T4	0.5	1.1	1.8	8.5	8.7	73.9	24.4
UNTREATED UREA	T12	3.4	20.3	28.8	32.8	33.1		
ARM U™ UAN – October 2016	T5	2.7	3.6	5.2	8.0	8.6	73.3	23.2
ARM U™ UAN – January 2017	T6	2.3	3.8	5.8	8.7	9.4	70.6	22.4
ARM U™ UAN – Fresh (April 2017)	T7	3.0	5.5	6.9	10.5	11.9	62.6	19.8
UNTREATED UAN	T11	5.4	14.6	21.2	31.3	31.8		

* Treated samples were preserved at UOM**. Samples were analyzed April, 2017

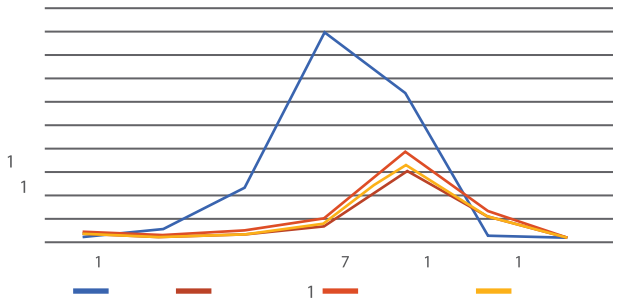
** UOM-University of Manitoba

** UOW-University of Winnipeg

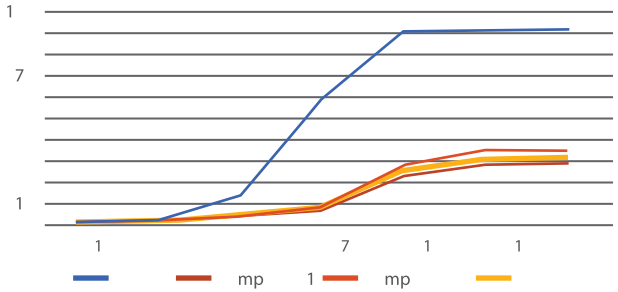
AMMONIA VOLATILIZATION FROM UAN

treated with ARM U™ compared with two competitor products

Daily ammonia volatilization loss - kg N/ha

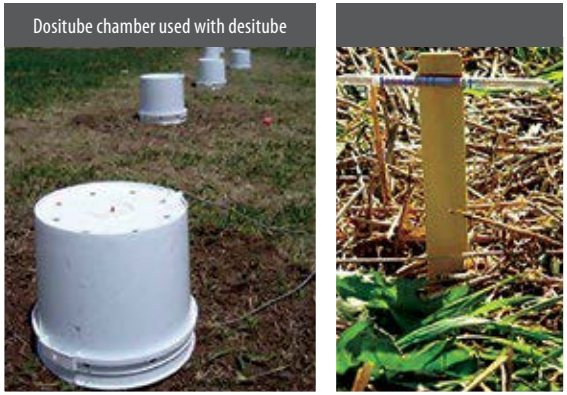


Cumulative ammonia volatilization loss - kg N/ha

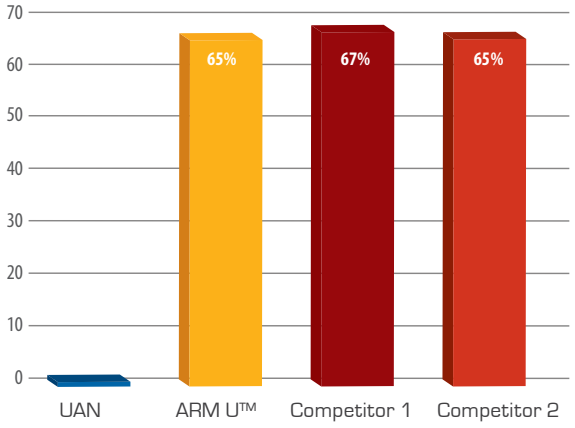


3rd party Research conducted by University of Manitoba and University of Winnipeg

Dositube chamber used with desitube



% Reduction of ammonia loss compared to untreated UAN



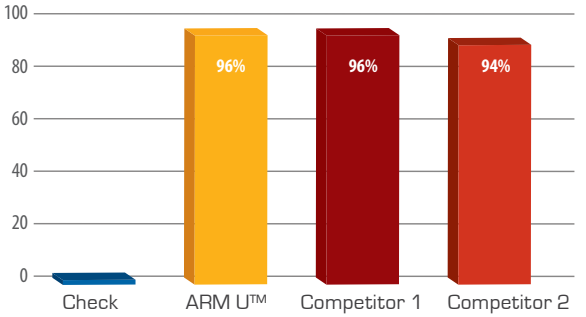
ARM U™ saves 65% of Nitrogen loss as ammonia gas from UAN.

AMMONIA VOLATILIZATION FROM UREA

treated with ARM U™ compared with two competitor products

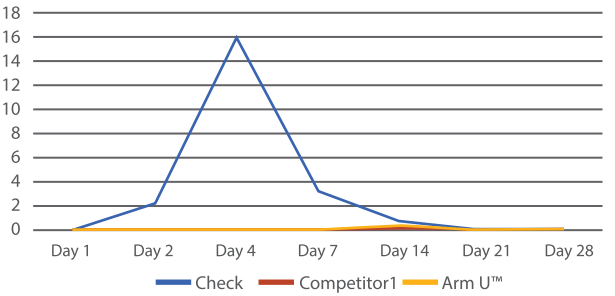
3rd party Research conducted by University of Manitoba and University of Winnipeg

% Reduction of ammonia loss compared to untreated urea

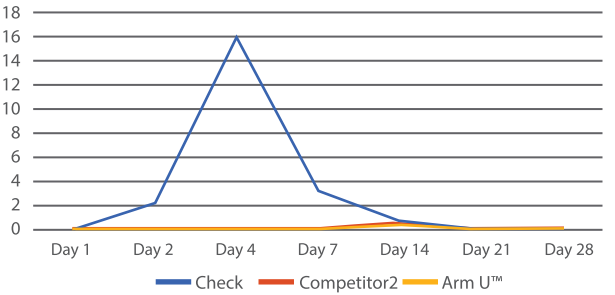


ARM U™ saves 96% of Nitrogen loss as ammonia gas from urea.

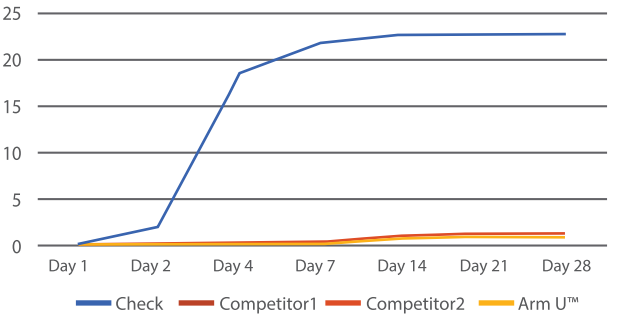
Daily ammonia volatilization loss - kg N/ha



Daily ammonia volatilization loss - kg N/ha



Cumulative ammonia volatilization loss - kg N/ha

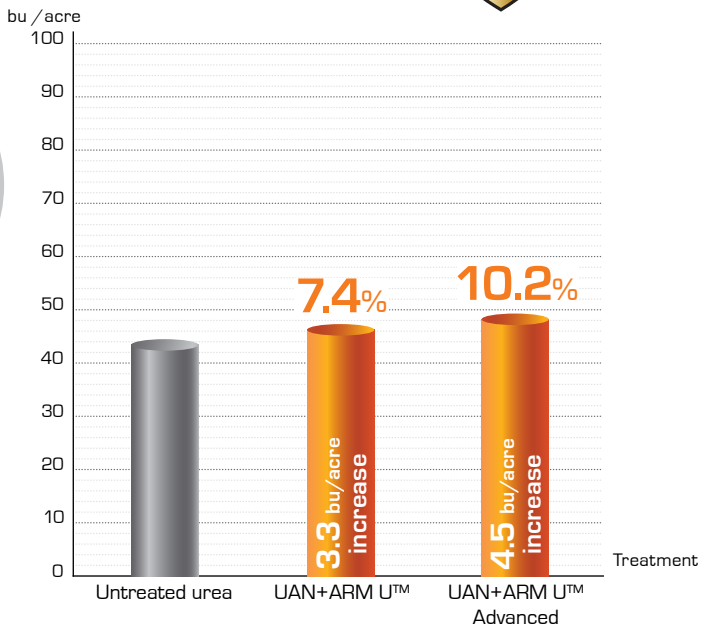


WHEAT • CARMAN MANITOBA
Spring applied UAN + ARM U™ and UAN + ARM U™ ADVANCED

Cumulative ammonia volatilization losses (% of applied N) and Yield

Treatment	Day 0-7	Day 14-28	Total	% reduction	Yield (bu/acre)	% change
Untreated UAN @ 75 kg N/ha	2.0	1.1	3.1		44.3	
UAN + ARM U™ (1.5 L/1000 L rate) @ 75 kg N/ha	0.4	0.9	1.3	58.0	47.6	7.4
UAN + ARM U™ Advanced (1.5 L/1000 L rate) @ 75 kg N/ha	0.9	1.0	1.9	38.0	48.8	10.2

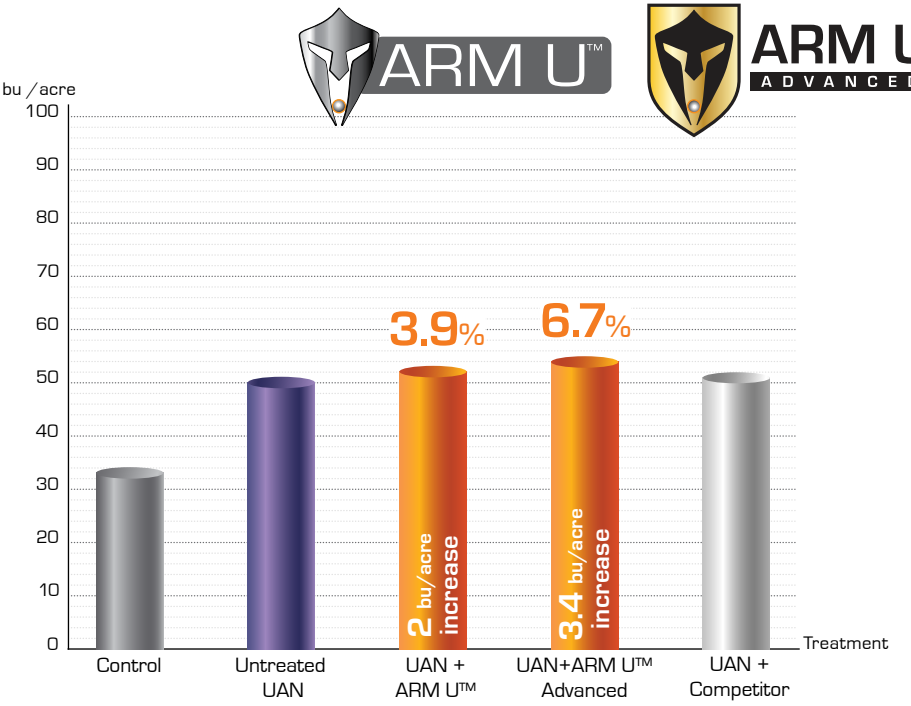
Third-party research conducted by the University of Manitoba



WHEAT • CARMAN MANITOBA
Fall applied UAN + ARM U™ and UAN+ ARM U™ ADVANCED

Cumulative ammonia volatilization loss

Cumulative ammonia volatilization loss (kg N/ha)	Day 0-7	Day 14-21	Total	% reduction	Yield (bu/acre)	% change
Control (without urea and UAN)	0.4	0.1	0.5		34.0	
Untreated UAN @ 100 kg N/ha	0.7	6.1	6.8		51.2	
UAN mixed with ARM U™ (1.5 L/1000 L rate) @ 100 kg N/ha	0.5	1.8	2.4	62.0	53.2	3.9
UAN mixed with ARM U™ Advanced (1.5 L/1000 L rate) @ 100 kg N/ha	0.4	1.3	1.7	75.0	54.4	6.7
UAN + Commercial Product (1.5 L/1000 L rate) @ 100 kg N/ha	0.4	1.5	1.9	72.0	52.0	1.6

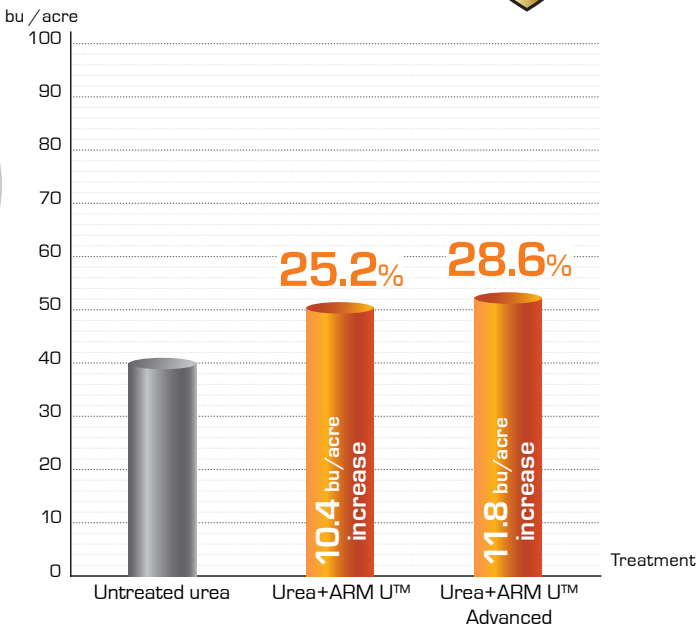


WHEAT • CARMAN MANITOBA
Spring applied UREA + ARM U™ and UREA + ARM U™ ADVANCED

Cumulative ammonia volatilization losses (% of applied N) and Yield

Treatment	Day 0-7	Day 14-28	Total	% reduction	Yield (bu/acre)	% change
Untreated urea @ 100 kg N/ha	17.5	1.4	18.9		41.3	
Urea coated with ARM U™ (2 L/1000 kg rate) @ 100 kg N/ha	0.4	5.4	5.8	69.0	51.7	25.2
Urea coated with ARM U™ Advanced (1.5 L/1000 kg rate) @ 100 kg N/ha	5.8	2.7	8.5	55.0	53.1	28.6

Third-party research conducted by the University of Manitoba



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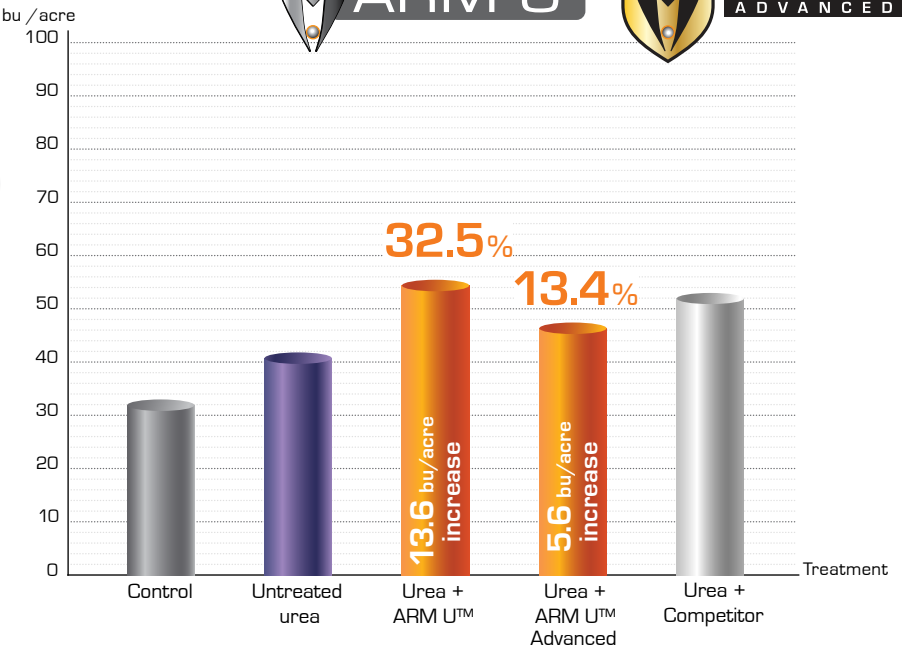
Fall applied UREA + ARM U™ and UREA + ARM U™ ADVANCED

Cumulative ammonia volatilization loss

Cumulative ammonia volatilization loss (kg N/ha)	Day 0-7	Day 14-21	Total	% reduction	Yield (bu/acre)	% change
Control (without urea and UAN)	0.4	0.1	0.5		33.3	
Untreated urea @ 100 kg N/ha	7.9	8.8	16.7		41.9	
Urea coated with ARM U™ (2 L/1000 kg rate) @ 100 kg N/ha	0.3	4.7	5.0	70.0	55.5	32.5
Urea coated with ARM U™ Advanced (1.5 L/1000 kg rate) @ 100 kg N/ha	0.3	3.9	4.2	75.0	47.5	13.4
Urea + Commercial Product (2 L/1000 kg rate) @ 100 kg N/ha	0.5	8.0	8.5	49.0	52.6	25.5



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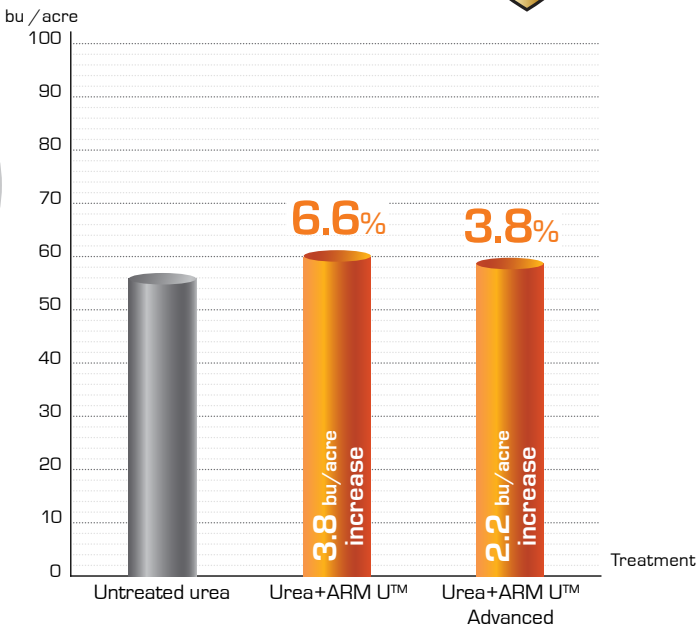
Spring applied UREA + ARM U™ and UREA + ARM U™ ADVANCED

Cumulative ammonia volatilization losses (% of applied N) and Yield

Treatment	Day 0-7	Day 14-28	Total	% reduction	Yield (bu/acre)	% change
Untreated urea @ 100 kg N/ha	21.9	1.0	23.3		57.2	
Urea + ARM U™ (2 L/1000 kg rate) @ 100 kg N/ha	1.5	4.9	6.4	73.0	61.0	6.6
Urea + ARM U™ Advanced (1.5 L/1000 L rate) @ 75 kg N/ha	5.3	1.9	7.2	46.0	59.4	3.8

Third-party research conducted by the University of Manitoba



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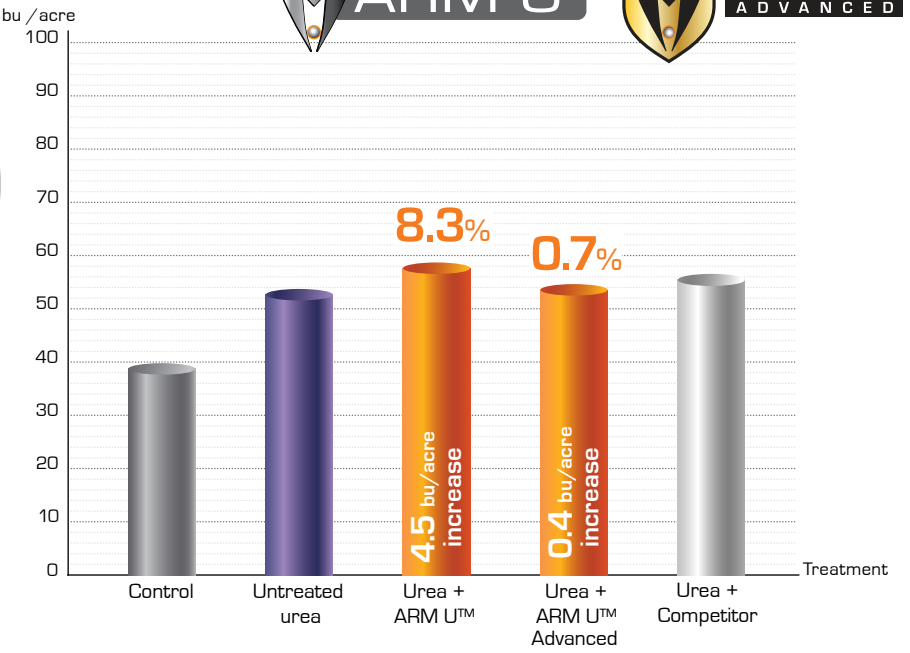
Fall applied UREA + ARM U™ and UREA + ARM U™ ADVANCED

Cumulative ammonia volatilization loss

Cumulative ammonia volatilization loss (kg N/ha)	Day 0-7	Day 14-21	Total	% reduction	Yield (bu/acre)	% change
Control (without urea and UAN)	0.2	0	0.2		38.9	
Untreated urea @ 100 kg N/ha	10.8	6.7	17.5		53.9	
Urea coated with ARM U™ (2 L/1000 kg rate) @ 100 kg N/ha	0.2	3.2	3.4	81.0	58.4	8.3
Urea coated with ARM U™ Advanced (1.5 L/1000 kg rate) @ 100 kg N/ha	0.4	4.4	4.8	73.0	54.3	0.7
Urea + Commercial Product (2 L/1000 kg rate) @ 100 kg N/ha	0.3	4.3	4.6	73.0	56.6	5.0



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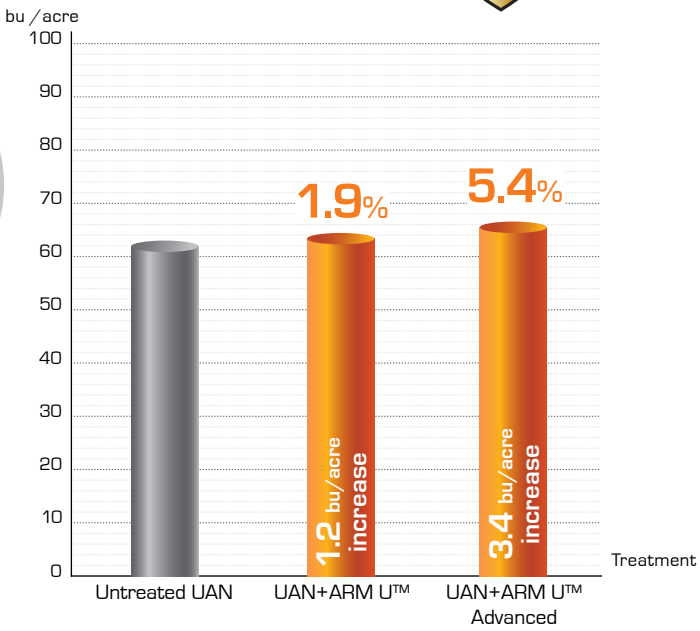
Spring applied UAN + ARM U™ and UAN + ARM U™ ADVANCED

Cumulative ammonia volatilization losses (% of applied N) and Yield

Treatment	Day 0-7	Day 14-28	Total	% reduction	Yield (bu/acre)	% change
Untreated UAN @ 75 kg N/ha	2.1	0.9	3.0		63.1	
UAN + ARM U™ (1.5 L/1000 L rate) @ 75 kg N/ha	0.5	4.6	5.1	70.0	64.3	1.9
UAN + ARM U™ Advanced (1.5 L/1000 L rate) @ 75 kg N/ha	0.8	3.5	4.3	43.3	66.5	5.4

Third-party research conducted by the University of Manitoba



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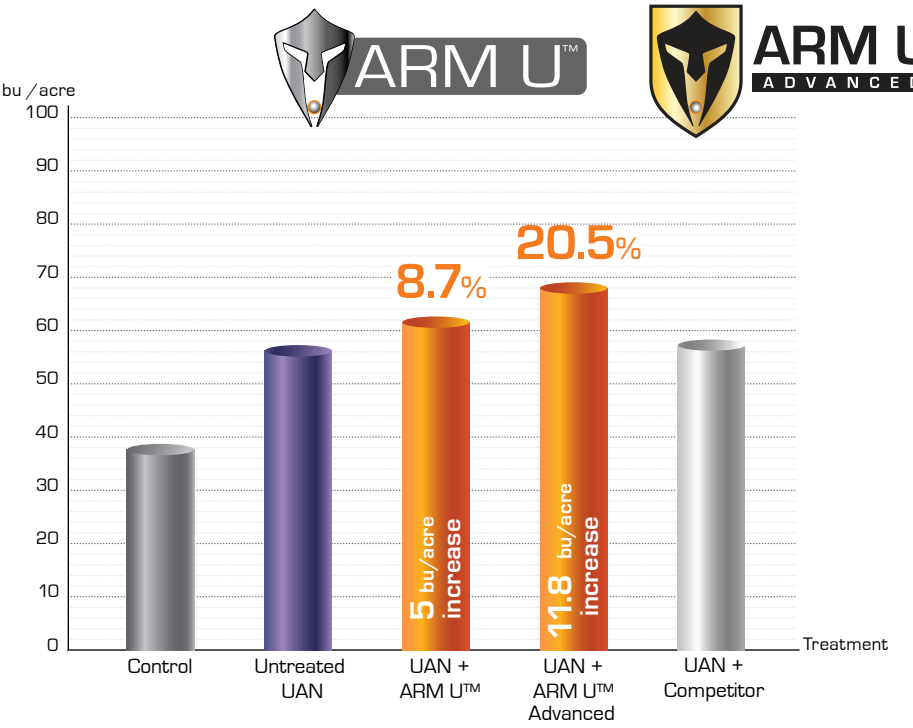
Fall applied UAN + ARM U™ and UAN + ARM U™ ADVANCED

Cumulative ammonia volatilization loss

Cumulative ammonia volatilization loss (kg N/ha)	Day 0-7	Day 14-21	Total	% reduction	Yield (bu/acre)	% change
Control (without urea and UAN)	0.2	0	0.2		38.9	
Untreated urea @ 100 kg N/ha	0.5	1.3	1.8		57.6	
UAN mixed with ARM U™ (1.5 L/1000 L rate) @ 100 kg N/ha	0.4	1.3	1.4	22.0	62.6	8.7
UAN mixed with ARM U™ Advanced (1.5 L/1000 L rate) @ 100 kg N/ha	0.4	1.1	1.1	56.0	69.4	20.5
UAN + Commercial Product (1.5 L/1000 L rate) @ 100 kg N/ha	0.2	0.8	1.0	47.0	58.4	1.4



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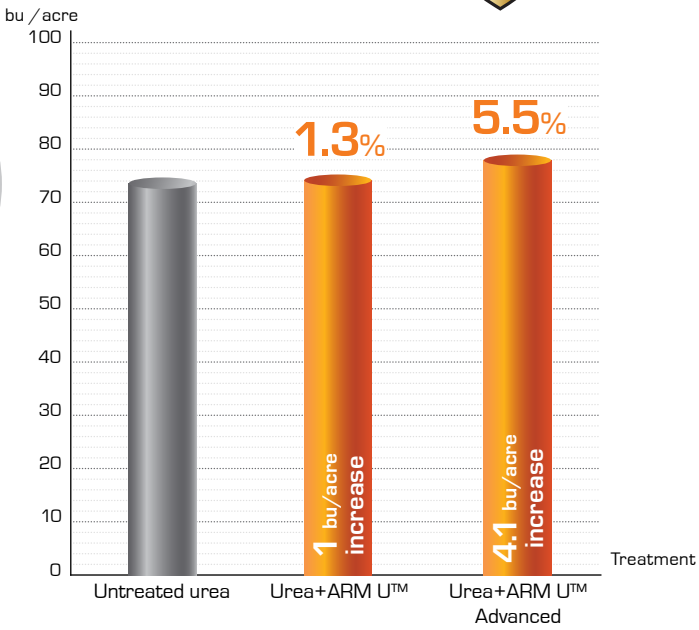
Spring applied UREA + ARM U™ and UREA + ARM U™ ADVANCED

Cumulative ammonia volatilization losses (% of applied N) and Yield

Treatment	Day 0-7	Day 14-28	Total	% reduction	Yield (bu/acre)	% change
Untreated urea @ 100 kg N/ha	10.2	10.2	20.4		74.7	
Urea coated with ARM U™ (2 L/1000 kg rate) @ 100 kg N/ha	0.9	6.7	7.6	63.0	75.7	1.3
Urea coated with ARM U™ Advanced (1.5 L/1000 kg rate) @ 75 kg N/ha	2.3	10.3	12.6	56.0	78.8	5.5

Third-party research conducted by the University of Manitoba



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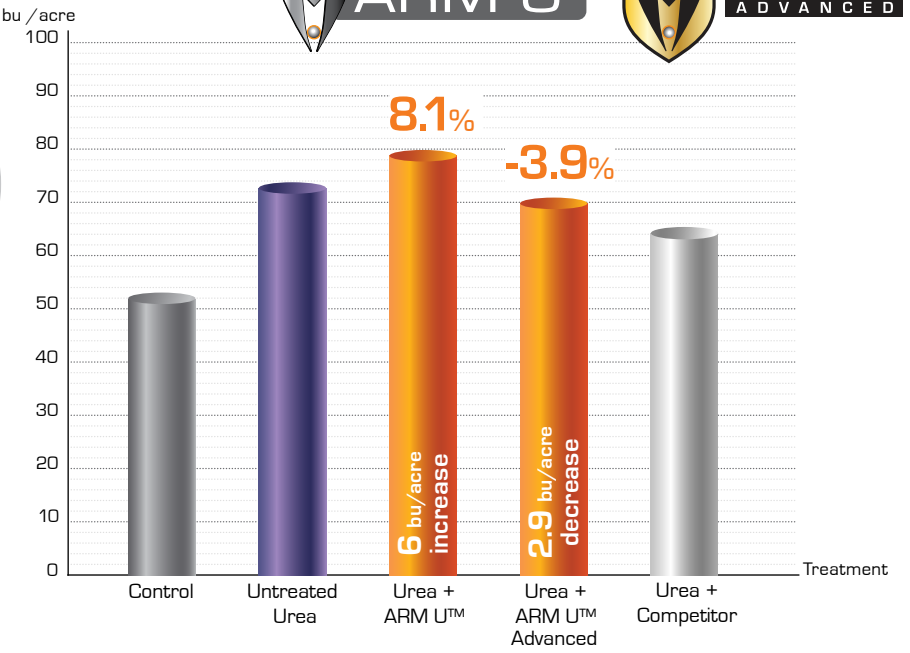
Fall applied UREA + ARM U™ and UREA + ARM U™ ADVANCED

Cumulative ammonia volatilization loss

Cumulative ammonia volatilization loss (kg N/ha)	Day 0-7	Day 14-21	Total	% reduction	Yield (bu/acre)	% change
Control (without urea and UAN)	0.4	0.1	0.5		53.4	
Untreated urea @ 100 kg N/ha	8.0	4.1	12.1		73.9	
Urea coated with ARM U™ (2 L/1000 kg rate) @ 100 kg N/ha	1.0	2.2	3.2	74.0	79.9	8.1
Urea coated with ARM U™ Advanced (1.5 L/1000 kg rate) @ 100 kg N/ha	1.1	2.1	3.2	73.0	71.0	-3.9
Urea + Commercial Product (2 L/1000 kg rate) @ 100 kg N/ha	1.0	4.3	5.3	56.0	65.7	-11.1



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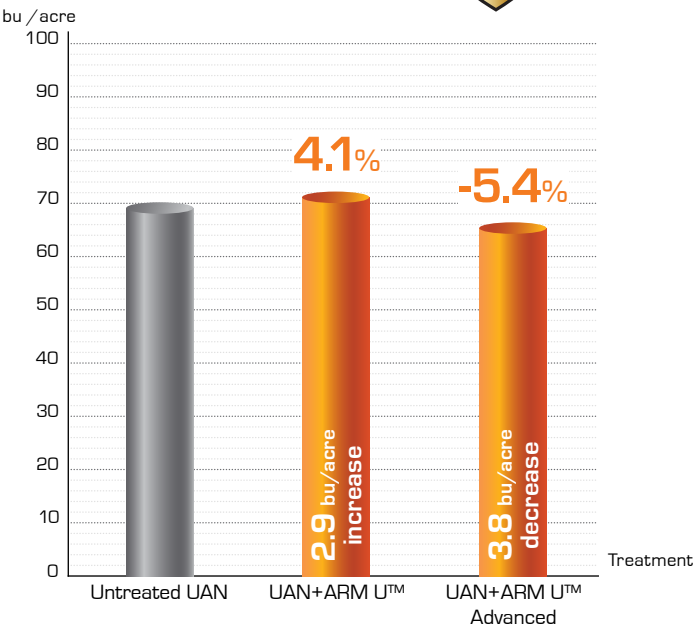
Spring applied UAN + ARM U™ and UAN + ARM U™ ADVANCED

Cumulative ammonia volatilization losses (% of applied N) and Yield

Treatment	Day 0-7	Day 14-28	Total	% reduction	Yield (bu/acre)	% change
Untreated UAN @ 75 kg N/ha	5.4	8.5	13.9		70.2	
UAN + ARM U™ (1.5 L/1000 L rate) @ 75 kg N/ha	2.3	9.0	11.3	19.0	73.1	4.1
UAN + ARM U™ Advanced (1.5 L/1000 L rate) @ 75 kg N/ha	2.8	13.3	16.1	-16.0	66.4	-5.4

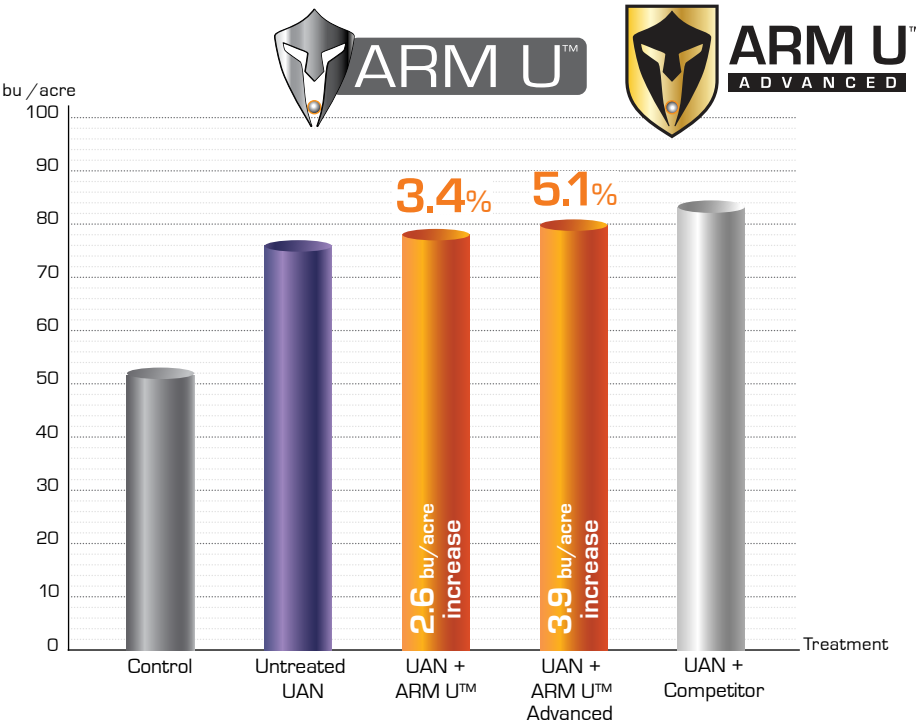
Third-party research conducted by the University of Manitoba



WHEAT • PORTAGE MANITOBA
Fall applied UAN + ARM U™ and UAN + ARM U™ ADVANCED

Cumulative ammonia volatilization loss

Cumulative ammonia volatilization loss (kg N/ha)	Day 0-7	Day 14-21	Total	% reduction	Yield (bu/acre)	% change
Control (without urea and UAN)	0.4	0.1	0.5		53.4	
Untreated urea @ 100 kg N/ha	7.3	3.0	10.3		76.9	
UAN mixed with ARM U™ (1.5 L/1000 L rate) @ 100 kg N/ha	2.2	3.3	5.5	46.0	79.5	3.4
UAN mixed with ARM U™ Advanced (1.5 L/1000 L rate) @ 100 kg N/ha	1.9	3.2	5.1	51.0	80.8	5.1
UAN + Commercial Product (1.5 L/1000 L rate) @ 100 kg N/ha	1.8	3.5	5.3	49.0	84.3	9.6

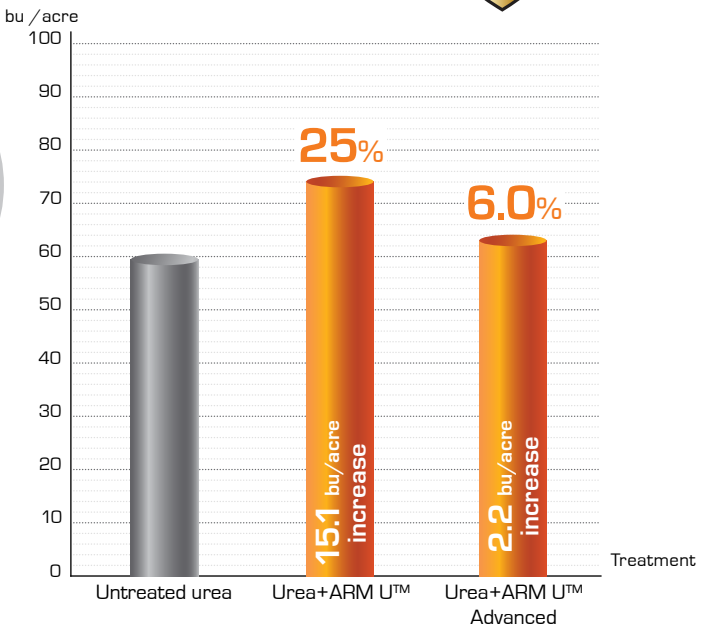


CANOLA • PORTAGE MANITOBA
Spring applied UREA + ARM U™ and UREA + ARM U™ ADVANCED

Cumulative ammonia volatilization losses (% of applied N) and Yield

Treatment	Day 0-7	Day 14-28	Total	% reduction	Yield (bu/acre)	% change
Untreated urea @ 100 kg N/ha	5.2	21.9	27.1		60.4	
Urea + ARM U™ (2 L/1000 kg rate) @ 100 kg N/ha	1.0	13.8	14.8	45.0	75.5	25.0
Urea + ARM U™ Advanced (1.5 L/1000 L rate) @ 75 kg N/ha	1.3	17.1	18.4	37.0	64.0	6.0

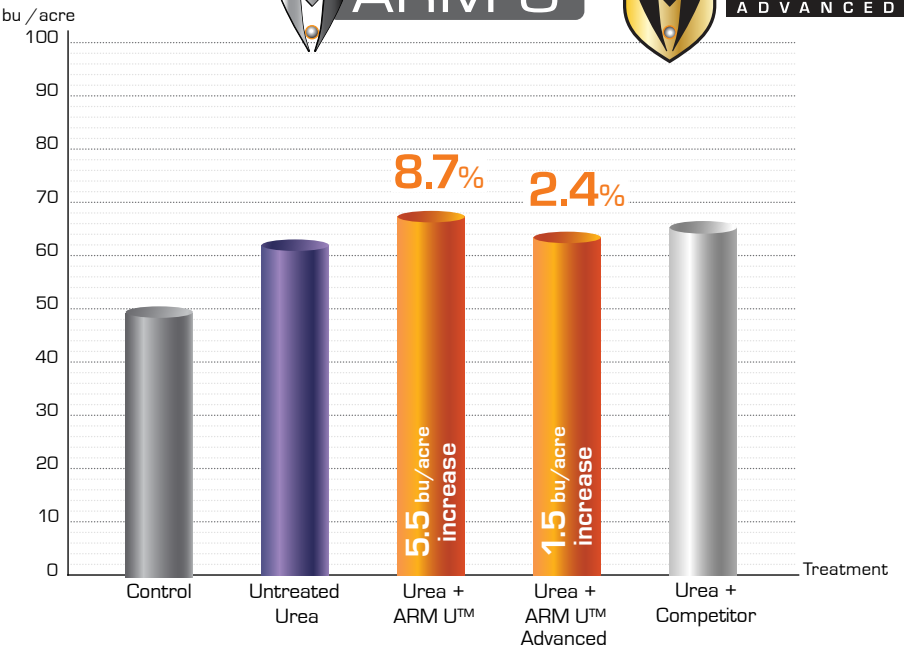
Third-party research conducted by the University of Manitoba



CANOLA • PORTAGE MANITOBA
Fall applied UREA + ARM U™ and UREA + ARM U™ ADVANCED

Cumulative ammonia volatilization loss

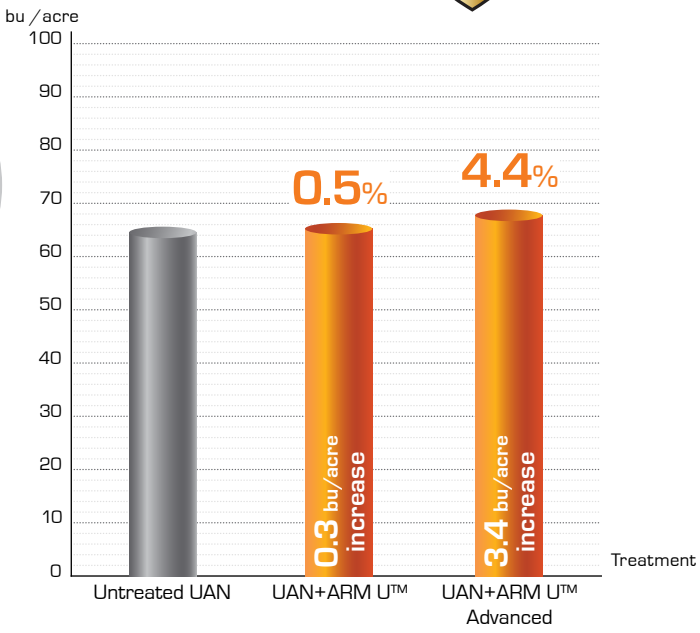
Cumulative ammonia volatilization loss (kg N/ha)	Day 0-7	Day 14-21	Total	% reduction	Yield (bu/acre)	% change
Control (without urea and UAN)	0.3	0.5	0.8		50.4	
Untreated urea @ 100 kg N/ha	6.8	10.5	17.8		63.0	
Urea coated with ARM U™ (2 L/1000 kg rate) @ 100 kg N/ha	1.0	2.0	3.0	83.0	68.5	8.7
Urea coated with ARM U™ Advanced (1.5 L/1000 kg rate) @ 100 kg N/ha	1.6	3.2	4.8	72.0	64.5	2.4
Urea + Commercial Product (2 L/1000 kg rate) @ 100 kg N/ha	1.3	1.7	3.0	83.0	66.4	5.4



CANOLA • PORTAGE MANITOBA
Spring applied UAN + ARM U™ and UAN + ARM U™ ADVANCED

Cumulative ammonia volatilization losses (% of applied N) and Yield

Treatment	Day 0-7	Day 14-28	Total	% reduction	Yield (bu/acre)	% change
Untreated UAN @ 75 kg N/ha	3.0	10.8	13.8		65.9	
UAN + ARM U™ (1.5 L/1000 L rate) @ 75 kg N/ha	1.3	10.3	11.6	16.0	66.2	0.5
UAN + ARM U™ Advanced (1.5 L/1000 L rate) @ 75 kg N/ha	2.4	9.9	12.3	11.0	68.8	4.4

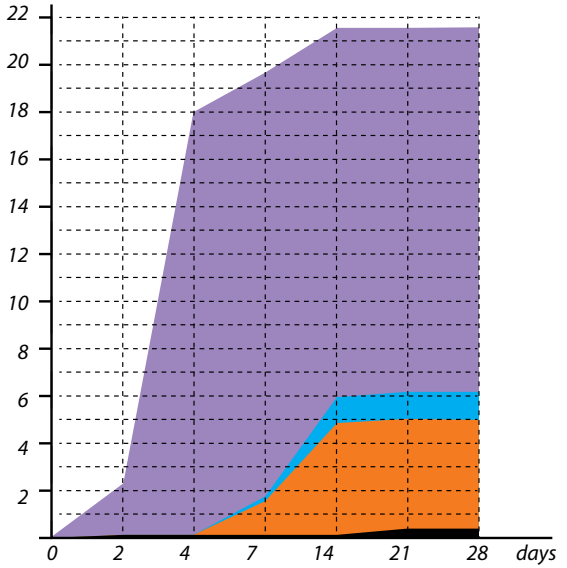


VOLATILIZATION & YIELD DATA - ARM U™ (UOM*/UOW**)

Cumulative ammonia loss • Wheat • Carman, Manitoba (kg N/ha)

Treatment	Day 2	Day 4	Day 7	Day 14	Day 21	Day 28
Check	0.1	0.2	0.2	0.1	0.3	0.3
Urea+ARM U™	0.1	0.2	1.7	4.9	5.0	5.0
Urea+Competitor	0.1	0.2	1.8	6.0	6.1	6.1
Urea	2.2	18.0	19.8	21.6	21.6	21.6

Treatment	% reduction	kg of N saved/ha	kg of urea saved/ha	Yield (bu/acre)	% Yield Increase
Check				30.4	
Urea+ARM U™	78%	16.6	36	36.5	20.1
Urea+Competitor	73%	15.5	33.7	32.9	8.2
Urea				31.2	2.6



Check

Urea + ARM U™ 78% reduction • 20.1% yield increase

Urea + Competitor 73% reduction • 8.2% yield increase

Urea

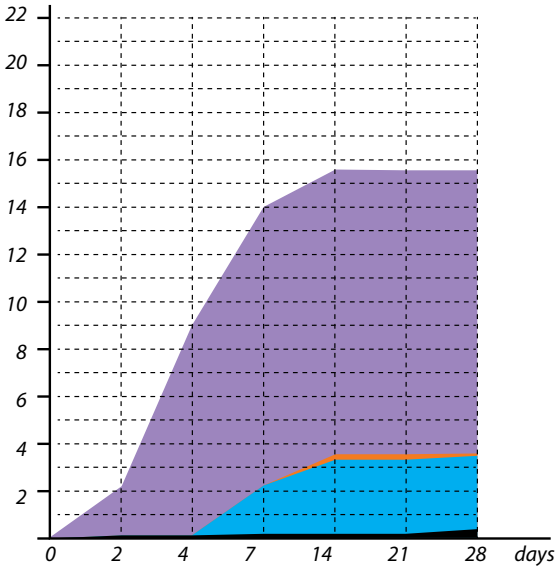
* UOM-University of Manitoba; ** UOW-University of Winnipeg

VOLATILIZATION & YIELD DATA - ARM U™ (UOM*/UOW**)

Cumulative ammonia loss • Wheat • High Bluff, Manitoba (kg N/ha)

Treatment	Day 2	Day 4	Day 7	Day 14	Day 21	Day 28
Check	0.1	0.1	0.2	0.2	0.2	0.3
Urea+ARM U™	0.1	1.0	2.3	3.5	3.5	3.5
Urea+Competitor	0.1	1.0	2.3	3.3	3.3	3.4
Urea	2.1	9.0	14.0	15.5	15.5	15.5

Treatment	% reduction	kg of N saved/ha	kg of urea saved/ha	Yield (bu/acre)	% Yield Increase
Check				12.9	
Urea+ARM U™	79%	12.0	26.1	26.9	96.4
Urea+Competitor	79%	12.2	26.5	33.8	146.7
Urea				13.7	



Check

Urea + ARM U™ 79% reduction • 96.4% yield increase

Urea + Competitor 79% reduction • 146.7% yield increase

Urea

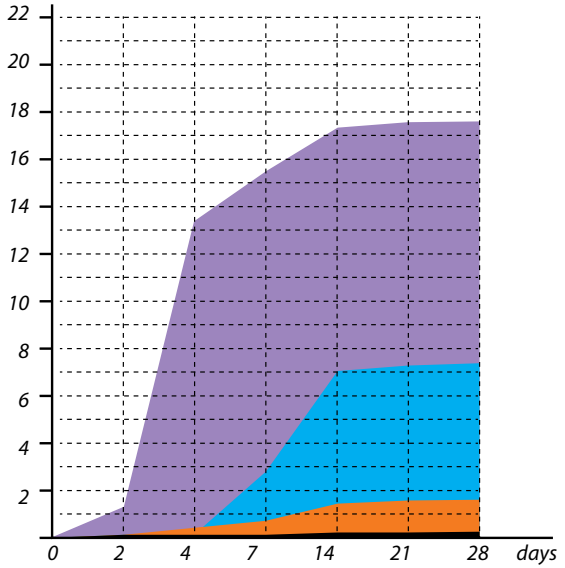
* UOM-University of Manitoba; ** UOW-University of Winnipeg

VOLATILIZATION & YIELD DATA - ARM U™ (UOM*/UOW**)

Cumulative ammonia loss • Canola • Carman, Manitoba (kg N/ha)

Treatment	Day 2	Day 4	Day 7	Day 14	Day 21	Day 28
Check	0.1	0.1	0.1	0.2	0.2	0.2
Urea+ARM U™	0.1	0.4	0.7	1.4	1.5	1.5
Urea+Competitor	0.1	0.2	2.9	7.0	7.2	7.3
Urea	1.3	13.4	15.4	16.7	16.8	16.8

Treatment	% reduction	kg of N saved/ha	kg of urea saved/ha	Yield (bu/acre)	% Yield Increase
Check					
Urea+ARM U™	92%	15.3	33.3	34.2	5.9
Urea+Competitor	58%	9.5	20.8	33.2	2.8
Urea				32.3	



Check

Urea + ARM U™ 92% reduction • 5.9% yield increase

Urea + Competitor 58% reduction • 2.8% yield increase

Urea

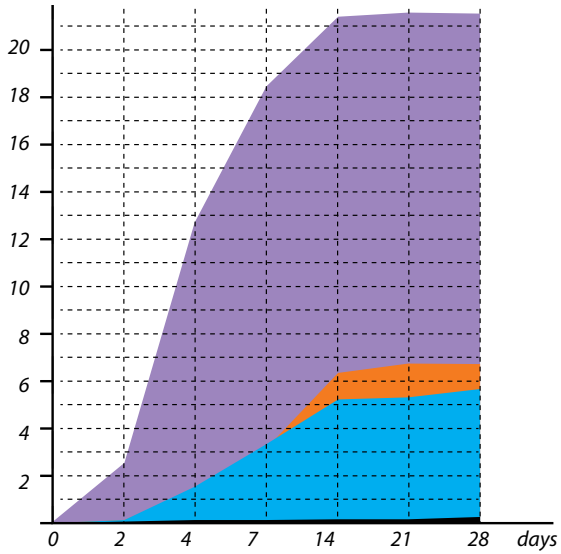
* UOM-University of Manitoba; ** UOW-University of Winnipeg

VOLATILIZATION & YIELD DATA - ARM U™ (UOM*/UOW**)

Cumulative ammonia loss • Canola • High Bluff, Manitoba (kg N/ha)

Treatment	Day 2	Day 4	Day 7	Day 14	Day 21	Day 28
Check	0.1	0.2	0.2	0.2	0.2	0.3
Urea+ARM U™	0.1	1.4	3.1	6.3	6.7	6.7
Urea+Competitor	0.1	1.6	3.1	5.1	5.2	5.7
Urea	2.6	12.9	18.5	21.3	21.6	21.6

Treatment	% reduction	kg of N saved/ha	kg of urea saved/ha	Yield (bu/acre)	% Yield Increase
Check					
Urea+ARM U™	70%	14.9	32.3	33.1	134.8
Urea+Competitor	75%	15.9	34.6	41.3	192.9
Urea				14.1	



Check

Urea + ARM U™ 70% reduction • 134.8% yield increase

Urea + Competitor 75% reduction • 192.9% yield increase

Urea

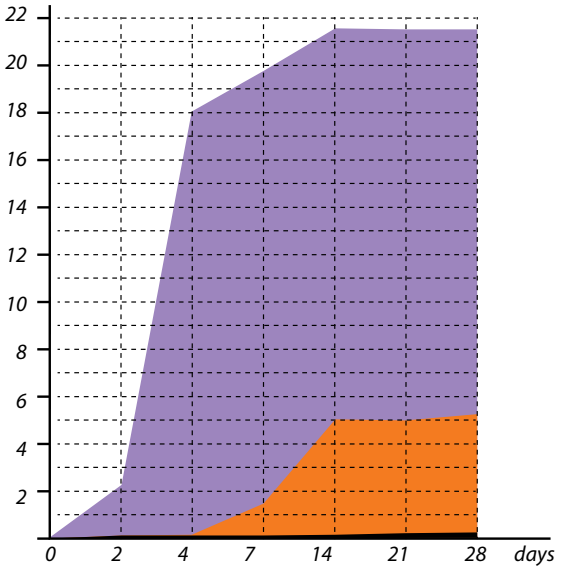
* UOM-University of Manitoba; ** UOW-University of Winnipeg

VOLATILIZATION & YIELD DATA - ARM U™ ADVANCED (UOM*/UOW**)

Cumulative ammonia loss • Wheat • Carman, Manitoba (kg N/ha)

Treatment	Day 2	Day 4	Day 7	Day 14	Day 21	Day 28
Check	0.1	0.2	0.2	0.2	0.3	0.3
Urea + ARM U™ ADVANCED	0.1	0.2	1.5	5.0	5.0	5.1
Urea	2.2	18.0	19.8	21.6	21.6	21.6

Treatment	% reduction	kg of N saved/ha	kg of urea saved/ha	Yield (bu/acre)	% Change
Check				30.4	
Urea + ARM U™ ADVANCED	78%	16.6	36	33.9	11.5
Urea				31.2	2.6



Check

Urea + ARM U™ Advanced **78% reduction • 11.5% yield increase**

Urea **2.6% yield increase**

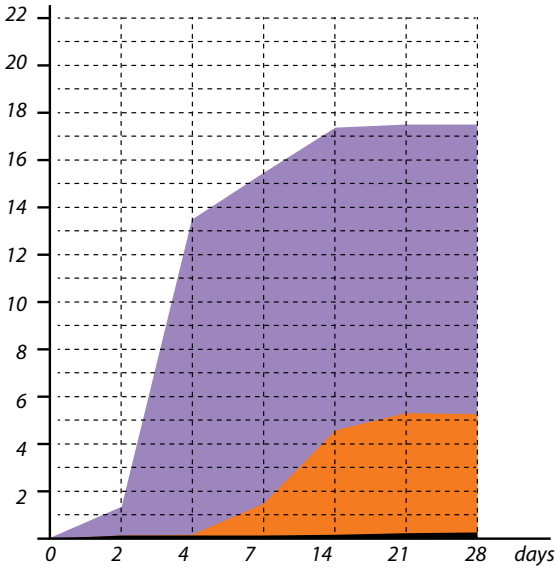
* UOM-University of Manitoba; ** UOW-University of Winnipeg

VOLATILIZATION & YIELD DATA - ARM U™ ADVANCED (UOM*/UOW**)

Cumulative ammonia loss • Canola • Carman, Manitoba (kg N/ha)

Treatment	Day 2	Day 4	Day 7	Day 14	Day 21	Day 28
Check	0.1	0.1	0.1	0.2	0.2	0.2
Urea+ ARM U™ ADVANCED	0.1	0.1	1.3	4.8	5.1	5.1
Urea	1.3	13.4	15.4	16.7	16.8	16.8

Treatment	% reduction	kg of N saved/ha	kg of urea saved/ha	Yield (bu/acre)	% Change
Check					
Urea + ARM U™ ADVANCED	71%	11.7	25.4	37.4	15.8
Urea				32.3	



Check

Urea + ARM U™ Advanced **71% reduction • 15.8% yield increase**

Urea

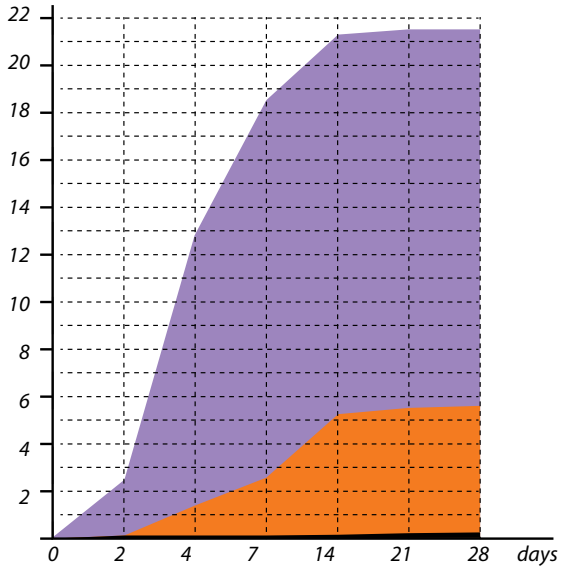
* UOM-University of Manitoba; ** UOW-University of Winnipeg

VOLATILIZATION & YIELD DATA - ARM U™ ADVANCED (UOM*/UOW**)

Cumulative ammonia loss • Canola • High Bluff, Manitoba (kg N/ha)

Treatment	Day 2	Day 4	Day 7	Day 14	Day 21	Day 28
Check	0.1	0.2	0.2	0.2	0.2	0.3
Urea + ARM U™ ADVANCED	0.1	1.4	2.7	5.2	5.4	5.5
Urea	2.6	12.9	18.5	21.3	21.6	21.6

Treatment	% reduction	kg of N saved/ha	kg of urea saved/ha	Yield (bu/acre)	% Change
Check					
Urea + ARM U™ ADVANCED	76%	16.1	35.0	39.3	178.7
Urea				14.1	

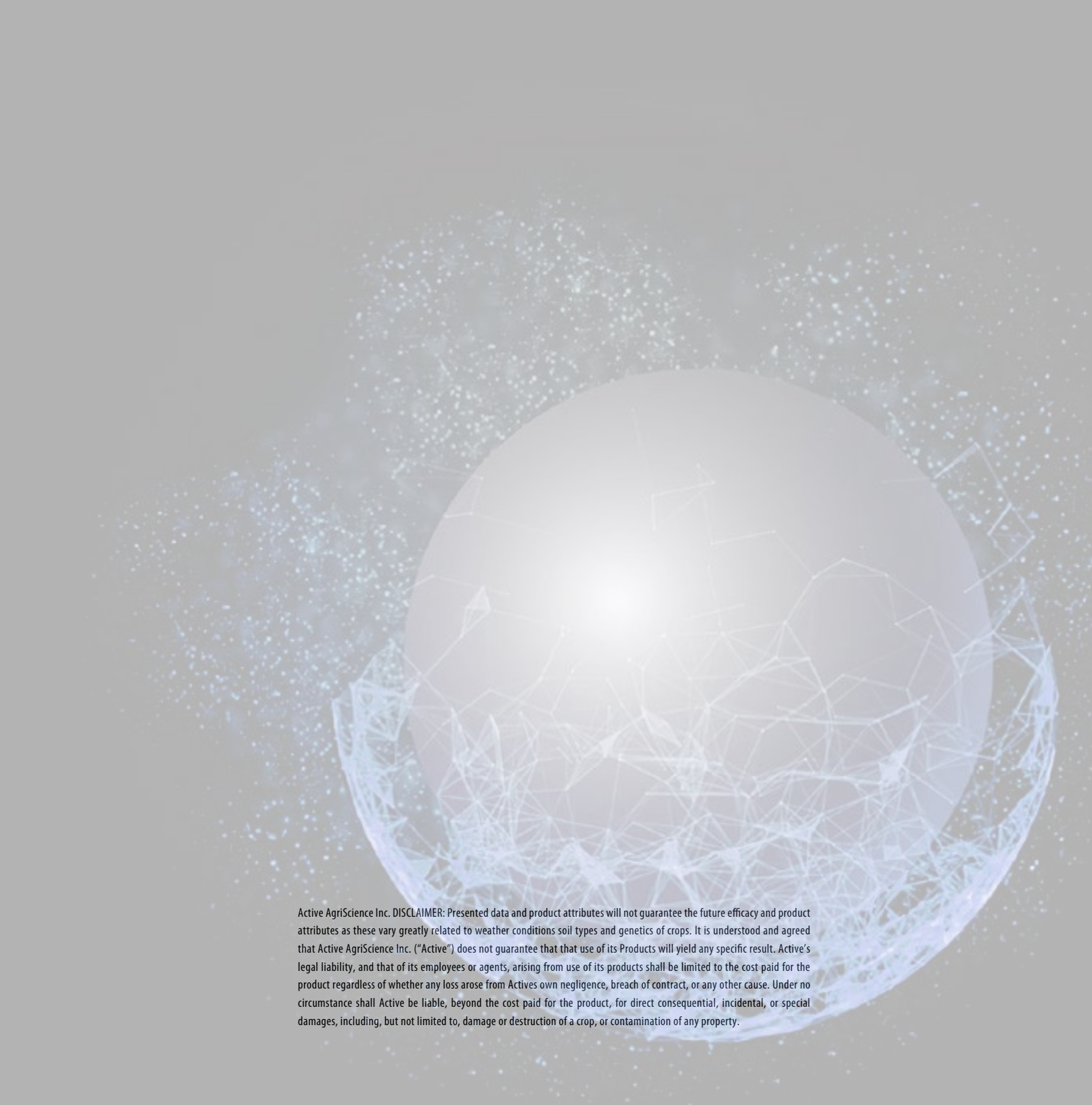


Check

Urea + ARM U™ Advanced **76% reduction • 178.7% yield increase**

Urea

* UOM-University of Manitoba; ** UOW-University of Winnipeg



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