Dive Into Your Fertility Program

As fertilizer prices continue on an upward trend, there is no better time than now to take a dive into your sugarbeet fertility program to "trim some fat" where you can. While reviewing soil tests the past couple years, as a coop, we've noticed many soil samples get submitted under the fertility recommendations of "7lbs of Nitrogen per/ton of projected yield". While these recommendations work in Idaho and drier climates where they have the ability to shut off water, they don't fit the growing conditions of the Red River Valley. This is because nitrogen moves to plants mostly via mass flow – mass flow is movement of water through the soil and into the roots. Where the water can be shut off, you can control nitrogen uptake more than we can here.

<u>Nitrogen Recommendations for</u> <u>Minn-Dak:</u> 0-2 ft soil sample = 100 lb N/acre 0-4 ft soil sample = 130 lb N/acre There is no fixed "X" pounds of nitrogen = "X" tons of yield.

ISSUE 57 - MARCH 2022 Emma Burt - Editor

Conditions for a good crop are conditions for good nitrogen use efficiency (NUE).

In a tough year, a higher amount of N/ton to produce a crop is needed, but the yield potential is knocked due to poor conditions. In a good year, a lower amount of N/ton to produce a crop is needed because the NUE increases. Additionally, weather for a great crop is weather for great mineralization — the soil will help provide any N that might be lacking.

BEET TOPICS

Time to Sugar Up!

We want to see the crop beginning to yellow about 6 weeks before main harvest—roughly the middle of August. To achieve this, we need the crop to run out of nitrogen. While we can't shut water off to control this, we can achieve it through the depletion of all soil nitrogen. Nitrogen is plant mobile, meaning that plants have the ability to move nitrogen from old leaves to make new leaves. In an excess nitrogen environment, sugarbeets don't move nitrogen from old leaves to new leaves because nitrogen is still being supplied from the soil. We want sugarbeets to draw nitrogen from old leaves — if they don't, we end up with a large, lush canopy that, while eye catching, shifts the sugarbeets' main focus to preservation and production of leaves. This means the sugarbeet puts all of its time, resources, and energy into maintaining that canopy. But, when we draw nitrogen from the old leaves, they senescence and die. **This pattern actually signals the sugarbeets to "pack their bags" or pack on the sugar because it's time to move on.**

What About Phosphorus?

Sugarbeets use phosphorus for energy compounds. Phosphorus has been proven to increase root yield in soils that test "low" without affecting quality. Since phosphorus is immobile in the soil, a 6-8" soil sample is sufficient. Phosphorus tests actually do not measure the chemical form utilized by plants like the nitrate test does — the phosphorus soil test is actually an index correlated to crop response to phosphorus fertilizer field trials.

When selecting a phosphorus test:

- soil pH < 7.4 use Bray
- soil pH >7.4 use Olsen

One way to cut some phosphorus cost could be to utilize a starter and decrease the broadcast rate. Research has shown that if using the Olsen test and the soil sample result < 8ppm phosphorus, use 3 gal/acre 10-34-0 in-furrow AND 40 lb/acre P₂O₅ broadcast. If using the Olsen test and the soil sample result is 8-16 ppm phosphorus, use either 3 gal/acre 10-34-0 OR the recommended broadcast rate P_2O_5 .

What About Potassium?

Potassium is also immobile in the soil, meaning a 6-8" soil sample is sufficient. We recommend that you broadcast potassium fertilizer due to negative germination effects when using starters that contain potassium.

	Pota	ssium S	Soil Test,	, ppm	
	VL	L	М	Н	VH
	0-40	41-80	81-120	121-150	150+
		Broado	ast Rate	K ₂ 0 lb/A	
MN‡	110	80	50	15	0
ND 1	120	90	50	0	0
ND 2	120	120	90	60	0

ND 1 refers to soil with a smectite/illite ratio < 3.5





https://www.ag.ndsu.edu/publications/crops/fertilizingsugar-beet-in-north-dakota

	Phosphorus Soil Test, ppm													
Test	VL	L	Μ	Н	VH									
Bray 1**	0-5	6-10	11-15	16-20	21+									
Olsen	0-3	4-7	8-11	12-15	16+									
		Broadca	st Rate P ₂	₂ O ₅ lb/A -										
	80	55	35	10	0									

The next three pages provide a brief walk-through of the cost per acre difference between University Extension/Minn -Dak fertility recommendations and the 7 lbs N/ton recommendation that is commonly used. *If following the 10-34-0/Broadcast combination, the MDFC recommendation will save you an additional ~\$20/acre.*

Nutrient Tr	The Soil	To	tern	retati	on		15	t Cron	Choic	e	2	nd Cro	n Choice			
Nutrient I	The son	10	terp	Mad	Ulah		15	eerop	Choic		2		Prentonee			
	S. Beets 130/101 V							S. Beets 7 lbs 🗸								
0-48″	36 ID/ acre	36 lb/acre ************************************									YIELD GOAL					
											25 Tons					
							SUGO	SESTED		IFS						
Nitrate																
01	2						Bro	oadcast		<u> </u>		sroadcas	t 🗸			
Phosphorus	3 ppm	*****					LB/ACF	RE	APPLI	CATION	LB/A	ACRE	APPLICATI	ON		
Potassium	69 ppm	*****	**			ſ	4	100			N	175				
0-48"	24 lb/acre	*****	***			P ₂	O5	80	Broad	lcast	P ₂ O ₅	100	Broadcas	t		
Chloride						K;	2 O	86	Broad	lcast	K ₂ O	108	Broadcas	t		
0-48"	42 lb/acre	*****	*****	******	*****	c	1	0			Cl	0				
Sulfur						5	s	0			S	0				
Boron	0.2 ppm	***				E	3	2	Broad	lcast	в	2	Broadcas	t		
Iron	0.49 ppm	*****	****			z	'n	1	Broad	lcast	Zn	3	Broadcas	t		
Manganese	7.8 ppm	*****	*****	* * * * * * * *	****	F	e	0			Fe	0				
Copper	0.35 ppm	*****	*	·		M	In	0			Mn	0				
Magnesium	385 ppm	*****	*****	* * * * * * *	*****	c	u	0			Cu	0				
Calcium	3913 ppm	*****	****	* * * * * * *	*****	M	g	0			Mg	0				
Sodium	22 ppm	***				Lir	ne				Lime					
Org.Matter	1.0 %	****								Ca	tion Exch	ande	% Base			
Carbonate(CCE)	4.1 %	*****	****	* * * * *		S	oil pH	B	uffer pH		Capacit	У	% Ca	9		
0-48"	0.22 mmno/cm	****				0-6	8.2				23.0 me	q	(65-75) 84.9	(1		
Soli Salts		Fort) wi a a		/10	/202	`							
		reri		er r	rice	\$ 3	/10/	202	2							
		00			00			~ =								
N - P - K		UU			80			85								
Product	Lb/Ac Pri	ce/A	c	Pri	ce/T	0 n	Ce	nts/	Lb							
Urea lbs/Ac	181 \$9	6.17		\$	1,06	55	\$	0.53								
1-52-0 lbs/Ac	154 \$7	7.69)	\$	1.01	0	\$	0.51								
Datash Ihs/Ac	1/2 \$6	0 07		2	 &A	50	¢	0 / 2								

	Price/Ac	\$234.78				25 Ton
N - P - K		175	100	108		
Product	Lb/Ac	Price/Ac	Price/Ton	Cents/Lb		
Urea lbs/Ac	334	\$178.09	\$ 1,065	\$0.53		
11-52-0 lbs/Ac	192	\$97.12	\$ 1,010	\$0.51		
Potash lbs/Ac	180	\$77.40	\$ 860	\$0.43		
	Price/Ac	\$352.61			Difference	\$117.83

Nutrient In	The Soil		Int	terp	oretat	ion		1	st Cro	op C	hoice		2	nd Cro	p Choice	
			VLow	Low	Med	High		9	. Beet	s 130	0/10 🗸)	s	. Beets	7 lbs 🗸 🗸	
0-48"	36 ll	b/acre	*****	****	*****	***			YIE	D GO	AL			YIELD	GOAL	
													ſ	28	Tons	
							_	SU	COESTE				SU			
Nitrate							_	30	GGESTE		IDELINES		30	GGESTED	GOIDELINES	
Olsen		3 nnm	*****					E	roadca	ist	~	,		roadcas	t Y	
Phosphorus		o ppili						LB/A	CRE		APPLICAT	TON	LB/A	CRE	APPLICAT	ION
Potassium	6	9 ppm	******	*				N	100	_			N	196		
0-40	24 1	o/acre	******	**			F	² 05	80	_	Broadca	st	P ₂ O ₅	112	Broadca	st
Chloride 0-48"	42	b/acre	******	****	*****	*****		K ₂ O	86	_	Broadca	st	K ₂ O	121	Broadca	st
Sulfur								Cl	0	_			Cl	0		
Boron	0.	2 ppm	***					s	0	_			S	0		
Zinc	0.4	9 ppm	*****	***				В	2	+	Broadca	st	В	2	Broadca	st
Iron	7.	8 ppm	*****	****	*****	****		Zn	1	_	Broadca	ist	Zn	3	Broadca	st
Manganese	1.	0 ppm	*****	****				Fe	0	+			Fe	0		
Copper	0.3	5 ppm	*****					Mn	0	_			Mn	0		
Magnesium	38	5 ppm	*****	****	*****	*****		Cu	0	+			Cu	0		
Sodium	391	3 ppm	******	****	*****	******		мg :	0	+			Mg	0		
Org.Matter	2	2 ppm	***					Ime					Lime			
Carbonate(CCE)		4.1 %	*****	****	****			Soil p	н	Buff	er pH	Ca	tion Exch	ange	%	Base S
0-48"	0.22 mm	ho/cm	*****										23.0 ma	y 	% Ca	%
Sol. Salts							0.	6" 8.2	2				23.0 116	4	84.9	1
			Fert	iliz	zer I	Prices	s 3	/10	/202	2						
NDZ		1	00			00			0 =							
N - P - K			UU			80			83							
Product	Lb/Ac	Pr	ice/A	c	Pri	ce/To	n	Ce	nts/]	Lb						
Urea lbs/Ac	181	\$9	6.17		\$	1,06	5	\$	0.53							
11-52-0 lbs/Ac	154	\$7	7.69		\$	1,01	0	\$	0.51							
Potash lbs/Ac	142	\$6	50.92		\$	86	0	\$	0.43							
	Price/Ac	\$2 :	34.78	;									2	R T	on	
															VII	
N - P - K		1	96		1	12]	21							
Product	Lb/Ac	Pr	ice/A	c	Pri	ce/To	n	Ce	nts/]	Lb						
Urea lbs/Ac	375	\$1	99.46	;	\$	1,06	5	\$	0.53							
11-52-0 lbs/Ac	215	\$1	08.77	'	\$	1,01	0	\$	0.51							
Potash lbs/Ac	202	\$8	86.72		\$	86	0	\$	0.43							
	Price/Ac	\$3	94.95	5							Diff	eren	ce		\$160	.17

Nutrient In The Soil			Interpretation					1st Crop Choice						2nd Crop Choice				
			VLow	Low	Med	High		S	S. Beets 130/10				S. Beets 7 lbs 🗸					
0-48"	36 lb/acre *		*****	****	*****	* * * *		YIELD GOAL					VIELD GOAL					
														20				
									005075	0.000				50				
Nitrate								SU	GGESTE	D GUI	DELINES		SU	IGGESTED	GUIDELINES			
								В	roadca	ist	~		E	roadcas	t 🗸			
Olsen Phosphorus		3 ppm	*****	¢				LB/A	CRE	4	PPLICATI	ON	LB/A	ACRE	APPLICATI	ON		
Potassium		69 ppm	*****	**				N	100				N	210				
0-48"	24	lb/acre	*****	***			P;	205	80	1	Broadcas	st	P ₂ O ₅	120	Broadcas	t		
Chloride							K	2 <mark>0</mark>	86	1	Broadcas	st	K ₂ O	129	Broadcas	t		
0-48"	42	lb/acre	*****	*****	*****	*****		CI	0				Cl	0				
Sulfur								s	0				S	0				
Zinc	0	0.2 ppm	***					в	2	1	Broadcas	st	В	2	Broadcas	t		
Iron	0	.49 ppm 7.8 ppm	******	****	*****	****	;	Zn	1	1	Broadcas	st	Zn	3	Broadcas	t		
Manganese		1.0 ppm	*****	****	*			Fe	0				Fe	0				
Copper	0	.35 ppm	*****	*			1	٩n	0				Mn	0				
Magnesium	3	885 ppm	*****	****	* * * * * *	*****	(Cu	0				Cu	0				
Calcium	39)13 ppm	*****	****	*****	******	1	1g	0				Mg	0				
Sodium		22 ppm	***				Li	me					Lime					
Org.Matter		1.0 %	****					Soil n	u	Duffe	r oll	Ca	tion Exch	ange	% E	lase Si		
0-48"	0.22 m	4.1 % nho/cm	*****	*****	****			son p		Bulle	ir pri		Capacit	У	% Ca	%		
Sol. Salts		,					0-6	8.2	2				23.0 me	q	(65-75) 84.9	(15- 13		
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N - P - K		1	00)		80			85)								
Product	Lb/Ac	Pri	ce/ A	C	Pri	ee/Ta	n	C	onte	/I.h								
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11-52-0 lbs/Ac	154	\$7	/.69		\$	1,01	0	1	50.5	1								
Potash lbs/Ac	142	\$6	0.92		\$	86	0	9	50.4	3								
	Price/Ac	\$23	4.7 8	8									3	RA	Ton			
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N - P - K		2	10		1	20		-	12	9								
Product	Lb/Ac	Pri	ce/A	C	Prid	ce/To	n	C	ents	/L/h)							
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11 52 0 lbs/Ac	7 01 7 21	¢21	65/	4	Ф Ф	1 01	0	ں ا	50.5 50.5	5 1	_							
D-4	231	JII D	0.34 2.45	•	D	1,01	U O	1	DU.J	1								
Potash Ibs/Ac	215	\$9)	2.45		\$	86	U	1	0.4	5								
	Price/Ac	\$42	2.70	0							Dif	fere	ence		\$18	37.92		

HUGE thank you to Cody Wahlstrom, Yaggie District Agriculturist, for compiling the information found in this issue.