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INTRODUCTION

"Plan For Profitable Sugarbeet Production"

Modern technology makes possible ease of production. Careful planning and management of all aspects of your sugarbeet enterprise will increase its profitability.

This production guide will provide useful information to assist you in making timely management decisions. However, it does not give extensive details on any subject discussed. More detailed and complete discussions of weed control, soil fertility, insect and disease control, and most other aspects of sugarbeet production in Minnesota and North Dakota are presented in past issues of the *Sugarbeet Research and Extension Reports* and is also available at the web site (<http://www.sbreb.org>).

The pesticide use suggestions in this guide are based on Federal label clearances and on research information from the North Dakota and Minnesota Agricultural Experiment Stations. All pesticide use suggestions are based on the assumption that all chemicals will continue to have a registered label with the Environmental Protection Agency.

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FERTILIZING SUGARBEET

NITROGEN & QUALITY: Sugarbeet quality involves two concepts: The percent of sucrose in the root and the level of impurities in the root, both of which affect extraction of sucrose by the processor. Production of high quality sugarbeet is especially important to growers being paid on the extractable sucrose content of their sugarbeet.

Proper nitrogen fertilizer use normally increases yield of both roots and sugar. However, excess nitrogen increases impurities and decreases the percentage of sucrose in the root. Excessive use of nitrogen fertilizer nearly always lowers sugarbeet quality significantly. Precise nitrogen management for every crop in the rotation will prevent over-application and build-up of nitrogen in the subsoil.

NITROGEN FERTILIZER USE GUIDELINES:

- The nitrogen fertilizer recommendations are the same for American Crystal Sugar Company, Minn-Dak Farmers Cooperative, and Southern Minnesota Beet Sugar Cooperative.
- 65 lbs of nitrogen per acre is required in the 0-2' depth soil profile to maximize early season crop growth, yield, and quality. *This is regardless of the amount of residual soil nitrogen below 2' deep.*

Guidelines for Adjusting Nitrogen Recommendations For Wheat After Sugarbeet

Research based guidelines for adjusting N recommendations following sugarbeet are:

- Reduce N 15-20 lb/Acre on sugarbeet fields with yellow green foliage.
- Reduce N 80 lb/Acre on sugarbeet fields with dark green foliage.

Guidelines for Adjusting N Recommendations for Crops Following Sugarbeet

In areas with a history of very high N levels and associated low sugarbeet quality, determination of plant N levels from a small number of sugarbeet top samples near harvest may help to further lower N levels above the normal green foliage guidelines. Aerial photography and satellite imagery have been helpful in directing this special sampling to minimize the number of samples, sampling time, cost, and delineate zone boundaries.

Guidelines for Grid Sampling

- If field history is unknown
- If fertility is high or fertilization has occurred for an extended time.
- If manure applications have been made.
- If two or more fields have been merged into one.
- If non-mobile nutrient levels are important.
- Use a pre-sample to determine whether to grid or not.

Guidelines for Zone Sampling

- If yield monitor/remote imaging reveals a relationship with landscape.
- If no history of manure use.
- If a history of relatively low fertility or fertilizer rates.
- If mobile nutrient data, especially N is required.

USING STARTER FERTILIZERS: Recent research in Minnesota and North Dakota indicates early season growth and/or yield responses to starter fertilizer are likely to occur. Significant responses are most likely to occur when soils test low to medium in phosphorus or have low levels of available N in the top 6 inches of soil.

P & K APPLICATION: A starter band application of $\frac{1}{2}$ of the broadcast rate of P and/or K can be a efficient on low-testing soils. On soils testing medium or above in P and/or K, the method of application is not as important. Caution with seed applications should be exercised. Applying greater than five pounds per acre of N+ K₂O in contact with the seed can reduce plant stand emergence. See Table 2 for suggestions.

Phosphorus Fertility Management: Many growers used only starter fertilizer or reduced broadcast P fertilizer rates along with starter fertilizer in 2001. Reports are excellent for early season growth and vigor.

Use of starter fertilizer alone or with reduced broadcast application rates can result in lower fertilizer costs. Guidelines should be the following considers:

- If the soil test level is 12-15 ppm or greater apply no starter or broadcast fertilizer.
- If the soil test level is less than 12 ppm and you fall applied the recommended broadcast phosphorus fertilizer, apply no more phosphorus.
- If the soil test level is 8-11 ppm you can use either 3 gpa of 10-34-0 or the recommended broadcast P₂O₅ recommendation for crop needs.
- If the soil test level is 7 ppm or less you can apply the broadcast recommendation or 3 gpa of 10-34-0 and only 30-40 lb/acre P₂O₅.
- If the soil test level is 4-7 ppm, 3 gpa of 10-34-0 produced yields equal to recommended broadcast P₂O₅ rates.

Producers should keep in mind that prolonged use of only starter or low broadcast P fertilizer rates may result in declining P soil est levels. Other crops in rotation with sugarbeets may grower best at soil P test levels that are higher than optimum soil test levels for sugarbeets.

MICRONUTRIENTS: Occasionally, growers have reported sugarbeet response to various micronutrients. Before using micronutrients, obtain a soil test for this nutrient.

FERTILIZER APPLICATION: *All P and K recommendations for sugarbeets are listed as amount to be broadcast.* It is recommended that on low- and medium-testing soils, P fertilizer be applied before the deepest tillage operation. On soils testing high and very high, shallow incorporation is adequate.

Table 2. Common starter phosphorus fertilizer sources and maximum amounts suggested for seed application

Source	Name	Dry or Liquid	Maximum amount to apply	Phosphate supplied lb/acre
10-34-0	Ammonium Poly Phosphate (APP)	Liquid	4 gal/acre	16
18-46-0	Diammonium Phosphate (DAP)	Dry	28 lbs/acre	13
11-52-0	Monoammonium Phosphate (MAP)	Dry	45 lbs/acre	24
0-44-0	Triple Super Phosphate (TSP)	Dry	No limit	N/A

ROTATIONS

Yields and quality are usually highest when sugarbeet follow, edible beans, barley or wheat in the crop rotation. Yields are usually high when sugarbeet follow corn, potatoes or summer fallow in rotation, but higher than desirable soil nitrogen levels may reduce crop quality. Three years research in Minnesota indicates sugarbeet yield significantly less when following soybeans versus barley in rotation.

ROW WIDTHS AND PLANT POPULATIONS

Row width of 22 inches is recommended in Minnesota and North Dakota. Research in the Red River Valley, Michigan, and irrigated beet growing areas indicates 400-600 pounds of sugar per acre are lost as row widths increase to 28 or 30 inches. Higher, more uniform plant populations are easier to establish on narrow rows. Growers interested in row widths greater than 22 inches must consider the anticipated advantages against lower yields per acre.

A good sugarbeet plant population at harvest should be near 35,000 uniformly spaced plants per acre. This population should produce very good yields of high quality sugarbeet.

SEEDS AND SEEDING

Many varieties of seeds are available commercially in Minnesota and North Dakota. The American Crystal Coded Variety Trial provides an excellent comparison of the performance of varieties in this area. Contact your agriculturist or seed company representative for more information on varieties. Complete coded variety trial results are available in the *Sugarbeet Research and Extension Reports*.

Sugarbeet should be planted as early as weather, soil moisture and temperature conditions permit. The potential for very high yields from early plantings is usually considered worth the risk of frost damage.

1. Plant seed 0.75 to 1.25 inches deep for maximum germination and emergence. Use shallow depths for earlier planting.
2. Use depth bands to ensure a more uniform planting depth.
3. Plant sugarbeet seeds 2.5 to 3.5 inches apart in 22-inch rows if they are to be thinned.
4. Plant sugarbeet seeds about 5 inches apart in 22-inch rows if planting to stand.
5. A planting speed of 4 miles per hour is recommended, except for Milton (3 miles per hour).
6. Perform needed maintenance on drills prior to planting.

DRILL MAINTENANCE CHECKLIST

- 1.** Check the condition of hoppers, drives, and chains.
- 2.** Check seed cutoff points to see that pawls fit seed plates properly.
- 3.** Make sure plates fit properly and filler plates are installed.
- 4.** Be sure disc furrow openers are clean and turn freely.
- 5.** Be sure depth bands are clean and properly adjusted.
- 6.** Check seed ejection tubes for restrictions or blockage.
- 7.** Be sure row spacings are correct, equal, and row markers adjusted.
- 8.** Lubricate the drill properly.
- 9.** Clean seed hoppers daily.
- 10.** Match seed sizes and planter plates carefully.
- 11.** Test the planter on a hard surface to check the seed distribution pattern.

SUGARBEET SEED SPECIFICATIONS

Company	Diameter (in.)	Thickness (in.)	Seeds/Case*	
				Small Size, Yellow tag or Label
Lion	7-8/64	4-5.5/64	1,000,000 (4 boxes/case)	200-500 (units)
Crystal	7-8/64	4-5.5/64	1,200,000 (12 units/case)	
Hilleshog	7-8/64	4-5.5/64	1,200,000 (12 units/case)	
Van der Have/Holly	7-8/64	4-5.5/64	1,200,000 (12 units/case)	
Seedex	7-8/64	4-5.5/64	1,200,000* (12 units/case)	
Betaseed	7-8/64	4-5.5/64	800,000 (8 units/case)	
				Med. Size, Pink or Red Tag or Label
Lion	8-9/64	4.5-6.5/64	1,000,000 (4 boxes/case)	200-450 (units)
Crystal	8-9/64	4.5-6.5/64	1,000,000 (10 units/case)	
Hilleshog	8-9/64	4.5-6.5/64	600,000 (6 units/case)	
Van der Have/Holly	8-9/64	4.5-6.5/64	1,000,000 (10 units/case)	
Seedex	8-9/64	4.5-6.5/64	1,000,000* (10 units/case)	
Betaseed	8-9/64	4.5-6.5/64	800,000 (8 units/case)	
				Large Size, Green Tag or Label
Crystal	9-10/64	4.5-6.5/64	800,000 (8 units/case)	200-400 (units)
Hilleshog	9-10/64	5-6.5/64	600,000 (6 units/case)	
Lion	9-10/64	5-6.5/64	800,000 (4 boxes/case)	
Van der Have/Holly	9-10/64	4.5-6.5/64	800,000 (8 units/case)	
Seedex	9-10/64	4.5-6.5/64	800,000 (8 units/case)	
Betaseed	9-10/64	5-5.5/64	800,000 (8 units/case)	
				Extra Large Size, Blue Tag or Label
Crystal	10-11/64	5-7/64	600,000 (6 units/case)	200-350 (units)
Hilleshog	10-11/64	5-7/64	600,000 (6 units/case)	
Seedex	10-11/64	5-7/64	800,000 (8 units/case)	
Van der Have/Holly	10-11/64	5-7/64	600,000 (6 units/case)	
Betaseed	10-11/64	5-7/64	600,000 (6 units/case)	

SUGARBEET SEED SPECIFICATIONS

	Extra Large Plus	Cardboard Box	Bulk Q-Bit
Betaseed	11-12/64	6-8/64	600,000 (6 units/case)
Crystal	11-13/64	5.5-8/64	400,000 (4 units/case)
Mini Pellets, Orange Label			
Betaseed	2M, 8-10/64 Diam.	400,000 (4 units/case)	
Van der Have/Holly		600,000 (6 units/case)	
Lion		400,000 (4 units/case)	
Hilleshog		500,000 (5 units/case)	100-100(units/case)
Seedex		600,000 (6 units/case)	
Crystal		600,000 (6 units/case)	
Regular Pellets, White Label			
Betaseed	4M, 9.5-11.5/64 Diam.	400,000 (4 units/case)	
Van der Have/Holly		300,000 (3 units/case)	
Lion		400,000 (4 units/case)	
Hilleshog		300,000 (3 units/case)	80-80 (units/case)
Seedex		400,000 (4 units/case)	
Crystal		300,000 (3 units/case)	
Jumbo Pellets, Gold Label			
Betaseed including Pro 200	5M, 11.5-13.5/64 Diam.	400,000 (4 units/case)	
Van der Have/Holly		200,000 (2 units/case)	
Lion		400,000 (4 units/case)	
Hilleshog		200,000 (2 units/case)	80-80 (units/case)
Seedex		300,000 (3 units/case)	
Crystal		200,000 (2 units/case)	

RECOMMENDED PLANTER PLATES, RAW SEED

Planter	Size of Cells (in.) Number	Thickness (in.)	Cell Dia. (in.)	Grower Correction
Small Size Seed				
John Deere Milton	B14015	.083 10(9½) x 6/64	9/64 10(9½)x6/65	
Medium Size Seed				
John Deere Milton	B13304	.105	10/64 11x7/64	
Large Size Seed				
John Deere Milton	B13931	.105	11/64 12½ x 7½/64	
Extra Large Size Seed				
John Deere	B29402 or B12733	.125 .125	12/64 11/64	Drill to 12/64
XL Milton Plate Size			13x8/64	

JOHN DEERE PLATE PLANTERS

- 1) Plastic plates turn harder than steel, so lubricate the plate, false ring and hopper bottom lightly with talc. Plate should turn easily by hand.
- 2) Monitor spring on drop tube and keep free of soil. Drop tubes should move freely up and down.

RAW SEED RECOMMENDED PLATES-VACUUM PLANTERS

Planter	Number	Cells (Holes)	Speed Spacing (in.)
Nodet	1.75 mm.	48	2.36-5.43
Monosem NG +	2.00 mm.	30	2.75-8.50
WIC	1.75 mm.	96	1.0-10.5
Heath	5.90-079 (1.5 mm.)	32	2.6-10.2

MONOSEM NG+

- 1) Using plates smaller than recommended may result in seed falling off plate when planter bounces in field.
- 2) 30 cell plates with the appropriate hole diameter will work though increased plate turning speed may require higher vacuum levels to avoid seed falling off plate.
- 3) When starting out in field, monitor seed discs to ensure seed is staying on plate. Increase vacuum if necessary.

WHITE SEED BOSS

- 1) Use shims to obtain proper air gap between plant and meter.
- 2) Adjustment and/or modification of the tickler brush will improve performance.
- 3) Sugarbeet cutoff brush with metallic bristles helps remove static electricity.

RECOMMENDATIONS FOR JOHN DEERE MAXI II PLANTER

Small plate - A 51712

Raw seed: use 1.5 inches of vacuum
Mini pellets: use 4 inches of vacuum
Regular Pellets: not recommended

Medium plate - H 136445

Small seed: 1/2 - 3/4 inch of vacuum

Medium seed: 1/2 - 3/4 inch of vacuum
Large and Extra large seed: 1½ - 2 inches of vacuum
Mini pellets: 2 inches of vacuum
Regular pellets: 2 inches of vacuum

Small plate works better with small seed (at 1.5 inches of vacuum) than with medium plate. Do not use medium seed with small plate

Large plate - A 51713

Small and Medium seed not recommended
Large seed: 1½-2 inches of vacuum
Extra large seed: 1½-2 inches of vacuum
Mini pellets: 2-3 inches of vacuum
Regular pellets: 2-3 inches of vacuum
XL large seed: 3.5-4 inches of vacuum

Sorghum plate - A 43066

Mini pellets not recommended
Regular pellets 3-4 inches vacuum
Jumbo pellets 5-8 inches vacuum

COMMENTS:

JOHN DEERE MAXEMERGE 2

- 1) These are the best plate combinations. Other combinations will work but may result in more skips or multiples. Adjust vacuum as necessary.
- 2) It is common for some of the new plates to have the air holes partially blocked with plastic residue from the production process. This causes skips and lower than desired population readings on the monitor. Before installing new plates, clean out obstruction by hand with a drill bit. Do not enlarge air hole.
- 3) Some new planters have small rough areas on casting from the production process, file down as necessary.
- 4) Run units with all seals in place. Without all seals in place a variation in vacuum levels from unit to unit will be experienced. Replace worn seals.
- 5) Check monitor eye in drop tube to make sure it is properly positioned. Seed may bounce off monitor eye assembly if it is twisted slightly out of position.

PELLETED SUGARBEET SEED PLANTER RECOMMENDATIONS

Planter	Mini Pellet (2M)	Plate Regular Pellet (4M)	XL Pellet (5M)
JD Maxemerge 2	Small or Medium	Medium or Sorghum	Sorghum Only
JD Plate Planters	B11-140MP Orange Plastic	B12-160RP Lt. Green Plastic	Not Recommended
Monosem NG+	40-16 or 40-20	40-20 or 36-22	36-22
Milton	12 x 9/64	14 x 11/64	Not Recommended
International Plate	3637A	465 157 R2	Not Recommended
Heath	1.50 mm	2.00 mm	2.00 mm
Wic, Nodet	1.75 mm	2.10 mm	2.10 mm
White Seed Boss	854047	N857115	N856067

PLANTING RATES & SEED SPACING - 22" ROWS

Inches Between Seed	No. of Seeds per/Acre	-----Approximate Pounds Per Acre¹-----					
		Small 54,000	Medium 42,000	Large 33,000	Extra Lg. 27,000	Mini Pellets	Regular Pellets
6.0	47,520	0.88	1.13	1.44	1.76	2.11	3.52
5.5	51,840	0.96	1.23	1.57	1.92	2.30	3.84
5.0	57,024	1.06	1.36	1.73	2.11	2.53	4.22
4.5	63,360	1.17	1.51	1.92	2.35	2.82	4.69
4.0	71,280	1.32	1.70	2.16	2.64	3.17	5.28
3.5	81,463	1.50	2.47	3.02	3.62	3.62	6.03

¹For 30-inch row multiply all table values by 0.73.
¹For 28-inch row multiply all table values by 0.79.

¹For 26-inch row multiply all table values by 0.85.
¹For 24-inch row multiply all table values by 0.92.

SEEDING RATE AND PLANT POPULATION ESTABLISHMENT (22' ROWS)

Plant Establishment %	Seed Spacing (Inches)					
	3	4	5	6	7	8
	------(Plants per 100' of 22" row)-----					
90	360	270	216	180	155	135
80	320	240	192	160	138	120
70	280	210	168	140	120	105
60	240	180	144	120	103	90
50	200	150	120	100	86	75
40	160	120	96	80	69	60
30	120	90	72	60	52	45

PLANT POPULATION

Plants per 100' of row		50	75	100	125	135	150
Plants/Acre	22 inch rows	11,880	17,820	23,760	29,700	32,076	35,640
Plants/Acre	30 inch rows	8,708	13,062	17,424	21,770	23,512	26,124

TRACTOR SPEED CALIBRATION CHART

-----Time in seconds required to travel a given distance-----

mph	100 ft.	200 ft.	300 ft.
2.5	27	55	82
3.0	23	45	68
3.5	20	39	58
4.0	17	34	51

