

# Sugar Beet

## PRODUCTION GUIDELINES





# Sugar Beet

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# Production Guidelines

SUGAR BEET	
OPERATIONS	AGRONOMICS AND TIMING
Crop rotation	Can be planted after winter wheat or other cereals; Must be turned every 4 years
Primary tillage	Ripper plough or plough 40 centimeters
Secondary tillage	Power harrows, spike harrows, light field cultivators
Planting (Northern Hemisphere)	
Timing	End of February-end of April (soil temperature 8° C)
Population at harvest	9-11 plants per square meter
Distance between rows	45-70 centimeters
Distance between plants	13-15 centimeters (45 spacing between rows)
Depth	2-3 centimeters
Soil insecticide	At planting in the furrows with seeds
Fertilizing (guidelines, to be adjusted on soil analysis base)	
Nitrogen (N kg/ha)	60-100 pre sowing or 60-80 pre sowing and 40-60 top fertilization
Phosphorus (P <sub>2</sub> O <sub>5</sub> kg/ha)	70-90 at the sowing: 50 in soils which content Olsen>20 ppm
Potassium (K <sub>2</sub> O kg/ha)	0 in good soils 150-180 in soils with P< 100 ppm
Weed control	Pre-emergence spraying and post emergence spraying 2 times; hoeing
Pest control	Spraying
Fungi	Spraying when first spots appears up to 30 days from harvest

## DROPLET SIZES FOR DIFFERENT CHEMICALS

ASABE STANDARD S-572.1 DROPLET SPECTRUM CATEGORIES <sup>1,2</sup>	CONTACT INSECTICIDE AND FUNGICIDE	SYSTEMIC INSECTICIDE AND FUNGICIDE	CONTACT FOLIAR HERBICIDE	SYSTEMIC FOLIAR HERBICIDE	SOIL-APPLIED HERBICIDE	INCORPORATED SOIL-APPLIED HERBICIDE	RELATIVE SIZE	COMPARATIVE SIZE	ATOMIZATION
VERY FINE (VF) RED								Point of Needle (25 microns)	Fog
FINE (F) ORANGE	✓							Human Hair (100 microns)	Fine mist
MEDIUM (M) YELLOW	✓	✓	✓	✓				Sewing Thread (150 microns)	Fine Drizzle
COARSE (C) BLUE		✓		✓	✓	✓		Stamp (420 microns)	Light Rain
VERY COARSE (VC) GREEN				✓	✓	✓		Stamp (420 microns)	Light Rain
EXTREMELY COARSE (XC) WHITE						✓		#2 Pencil Lead (2,000 microns)	Thunderstorm

Droplet sizes are suggestions for each pesticide. <sup>1</sup> Based on VDO.5, the Volume Master Diameter (VMD) designation. Source: Kansas City University.

<sup>2</sup> Revision of Stantard S-572.1 also includes extra-fine and ultra-coarse categories for non agricultural users.

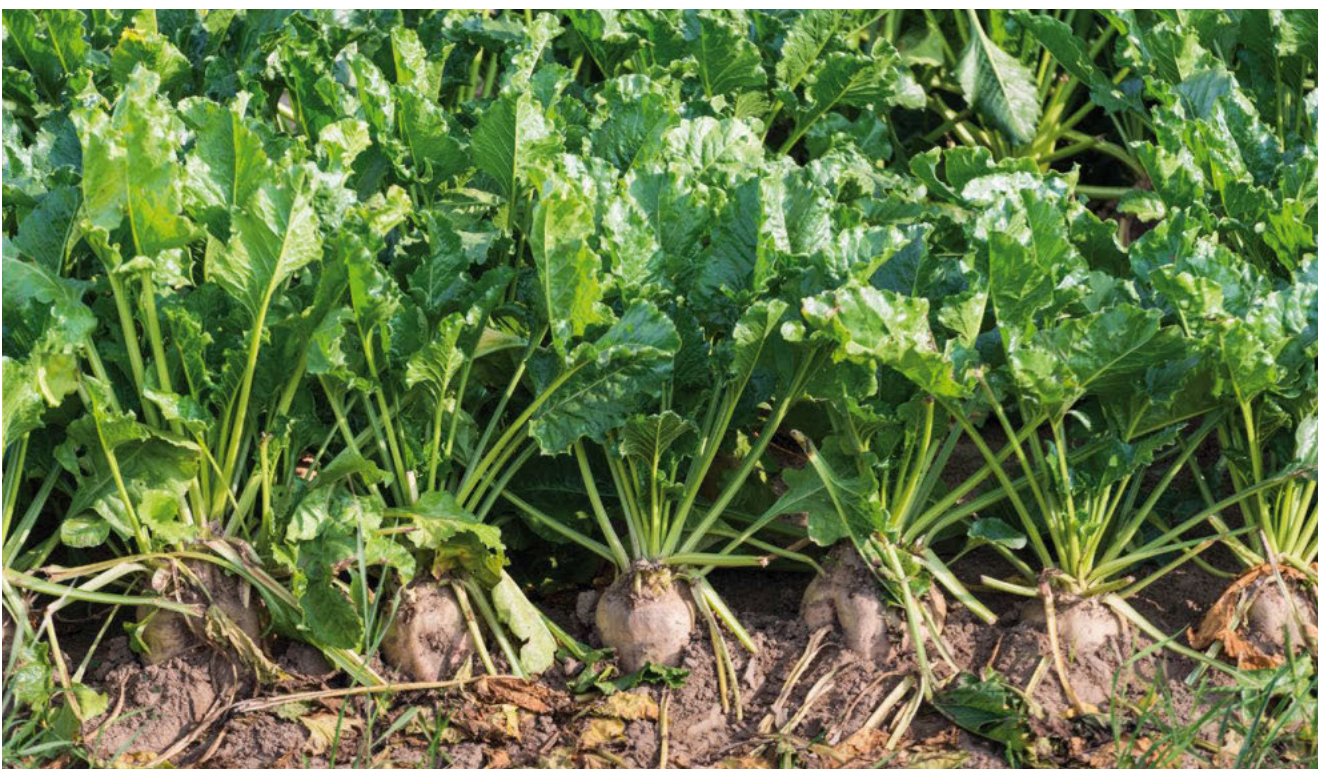
This droplet guide summarizes suggested droplet sizes for a variety of chemicals, based on the ASABE standard droplet spectrum categories.

# Crop Rotation

## WHY IS IT IMPORTANT?

- **Crop rotation, as a rule, can improve the performances of any crop.** Sugar Beet is very sensitive to crop rotations due to viruses, fungi, and insects. Sugar Beet should not be grown on the same field within the same 4-5 year period in order to avoid the building up of pathogens.
- **Crop Rotations** allow the farmer to spread labor intensive operations out throughout the duration of the year reducing labor and equipment requirements.
- **Exploitation of soil fertility** is improved, as different crops roots explore different layers of soil and utilize different nutrients. Soybean enriches the content of N in soil for following crops.
- **Structure of soils improves** because residues from crop roots stay at different depths and crop residues have different nutritional contents.
- **Management of pests and diseases get easier** because different crops have different pests: for Sugar Beet particularly critical diseases are Rhizomania and Cercospora. Crop rotations are the main means to avoid or reduce damages.
- **Management of weeds also get easier** for the same reason: e.g. control of monocot is much more easy in Sugar Beet than in monocot crop.

## THE USEFUL PART OF PLANTS GROWS INTO THE SOIL





## SUGAR BEET DEVELOPMENT STAGES



V 1.0



V 1.1



V 1.8



V 2.1



V 2.6



V 3.8



V 4.1



V 4.7



V 5.7



V 6.3



V 7.2



V 8.4

# Tillage

## PRIMARY AND SECONDARY

- **Primary tillage is crucial** for good Sugar Beet yields because the end product is a root which develops underground. As a result, texture and physical structure of soil have a larger impact when compared with other crops.
- Primary tillage **must be carried out at fall**. Tillage and preparation can take substantial time and wintering of the fields helps to get proper soil tilth, specially in heavy soils.
- Moldboard plows are the main tool for primary tillage with Sugar Beets. Disk rippers can be used as an alternative, but do not promote the same level of soil tilth when compared to plows.
- **Secondary tillage** is carried out before planting in spring. The goal is to achieve a proper seedbed, which means soil particles of right size for good contact between seeds and soil. This is crucial for Sugar Beet which seeds are thin and weaker than cereals.
- **Soil with a rough surface** hinders proper seed germination and plant growth ultimately leading to lost potential yield.
- **Large soil clods** can cause planter row units to bounce. This makes it challenging to control planter depth and maintain seed placement accuracy for uniform plant spacing.
- **Different heights** in the soil surface result in variable moisture and temperature levels.
- **A good seed bed** is important because plant roots require water and oxygen from the soil pore space.
- **A good seed bed** is defined as:
  - Smooth and level seed bed
  - Good soil tilth
  - Proper clod size (2-5mm)
- **The right soil-air-water** balance helps limit plant stress during drought periods and enables the plant to fully explore the soil profile for nutrients. Plants are able to use water efficiently and grow strong roots for good anchorage.
- **At the end in Sugar Beet** what we need is a very smooth seedbed.

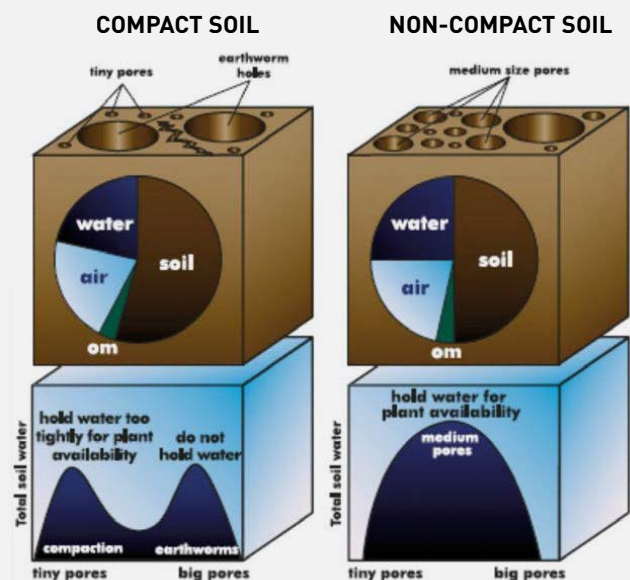
## WATER MANAGEMENT THROUGH TILLAGE

We can not manage weather or soil texture. But we can manage tillage.

### PONDING

#### MISCONCEPTION: PONDING IS A RESULT OF TOO MUCH RAINFALL

Not necessarily. Usually ponding is a result of poorly managed soil. When soil is compacted, it cannot absorb water. Compacted soil is like a sponge that is squeezed tight: there is no space for air and water. To make matters worse, compacted soil forms an impenetrable layer that prevents excess water from draining through. The result is ponding.





# Planting

## EARLY PLANTING

- **Sugar Beet 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.
- **Plant Sugar Beet seeds 8 to 10 centimeters** apart if they are to be thinned.
- **Plant Sugar Beet seeds 11 to 13 centimeters** apart if planting for a stand.
- **A planting speed of 6-7km** per hour is recommended when using pneumatic planters. If utilizing mechanical planting 4-6km per hour.
- **Perform maintenance** on planter prior to planting.
- **Research shows that an ideal stand** at harvest is between 8 and 11 plants per square meter, which means 15-18 seeds at sowing, with 45cm spacing (1.5-1.8 units per hectare). Ideal stand is dependent on field germinating capacity.

## UNIFORMITY IS EVERYTHING

- **Uniformity in Sugar Beet emergence** is an important factor for high yield crops. Producing a high yield crop starts with the right balance between healthy, productive plants and the plant's ability to utilize available resources.
- **Uniformity begins** with a well-prepared seed bed.
- **Plants that emerge uniformly** and progress at the same rate of development throughout the growing season – also known as “photocopy plants,” – deliver improved yield potential. Two bad plants will not produce the same yield as one good plant.
- **Uneven emergence introduces inefficiencies and adds competition within the stand.** Larger, early emerging plants obtain a greater proportion of available resources (light, water, nutrients) than smaller, later-emerging plants.

## SIX PRIMARY AGRONOMIC DRIVERS OF SEED PLACEMENT ACCURACY

- Producers should consider **six agronomic drivers** of seed placement accuracy at planting time. Depending on the type of seed and field conditions, certain drivers may have more or less importance: for Sugar Beet, every point is critical:
  1. **Proper and accurate seed depth**
  2. **Uniform and accurate seed depth throughout the field**
  3. **Good soil-to-seed contact**
  4. **Uniformly correct soil pressure all around the seed**
  5. **Accurate seed population**
  6. **Accurate in-row seed spacing**
- Sugar Beet precision planters should be equipped with granular insecticide dosage and fertilizer hopper for Phosphate, which is needed at planting (starter).

## PRECISION PLANTING



# Spraying

## FACTS

- In Sugar Beet cultivation, **crop protection is of paramount importance**. Diseases, insects, and weeds are serious competitors for crop, and spraying is needed on a regular basis.
- **Weed control** is carried out both with pre-sowing, pre-emergence and post emergence (on-top spraying). Weeds and/or pest can damage the yield up to the 100%, if not controlled or controlled too late.
- **For example**, research in the United States (North Dakota State University) has shown that if Redroot Pigweed is allowed to achieve a density of three plants per meter in a single row, 44% Sugar Beet yield loss is possible.
- **Sugar Beet is a low height crop** and many weeds can grow taller than Sugar Beet. Because weeds can become taller than the crop, Sugar Beet is more susceptible to yield losses due to weed competition compared to other high-canopy crops.
- **Insect pests** (root maggot, flea beetles, cutworm) and fungi diseases (Cercospora, leaf spot) are major concerns in Sugar Beet production.
- The high cost of applications and the higher volume of application required for Sugar Beet cultivation makes **accurate chemical applications a necessity**.
- **Adjustments** of pressure and volume are required depending on what the target is (weeds, fungi, insects).
- **Drift control** is another important factor to avoid damaging surrounding environment and crops.

## MORE FACTS ON WEEDS

- **Weeds** losses from direct competition are only part of the problems that may be caused by weeds. Weeds as a rule also:
  - a. Cause problems with mechanized harvesting
  - b. Reduce the quality of the harvested product
  - c. Produce seed that increases future weed problems
  - d. Act as co-hosts for insects and diseases
  - e. Increase tillage needed for weed control
- **Pest control** (mainly Cercospora, cutworm, root maggot and others) is often needed through top spraying.
- **When spraying is needed**, timeliness is more crucial than in other operations. Weeds and pests are to be hit in right time.
- **Productivity and reliability** are important factors affecting the result of spraying operations.

(North Dakota State University)



## MORE FACTS ON WEEDS



**PIGWEEED**



**WILD RADISH**



**VELVET LEAF**



**LAMBSQUARTER**

## INSECTS AND DISEASES



**RHYZOMANIA**

**CERCOSPORIA  
LEAF SPOT**

**FLEA BEETLE**

**APHIDS**

## TOOLS



**New Holland Guardian Sprayers** have clearance and balance which are crucial facts from agronomic point of view. Delivering consistent droplet size is a critical part of sprayer operation. This function can be more important depending on which chemical is used and on what canopy type.

## Hoeing

- **Hoeing** was a must whether or not herbicides are used.
- **Hoeing is an essential operation**, and helps with weed control, improving the texture of soil and managing limited water in dry soil conditions.
- **A working depth about 4-5cm** helps to kill weed that have survived herbicides applications and interrupts the porosity in the upper layer of soil. Interrupting porosity and closing surface cracking can help to reduce moisture losses.



# Machinery

## IMPLEMENTING YOUR GROWTH PROJECTS

Crop producers know that their soil is the most precious natural resource, and better soil conditions mean higher crop yields. New Holland knows that every individual plant counts towards your bottom line and that's why we design our equipment specifically to help you maximize yield potential.



## TRACTORS

New Holland tractor Series offer a huge choice of power and models. For conventional operations in Sugar Beet, T.7, T.8 (shown) series tractors are suitable from primary Tillage to harvesting.

Secondary tillage and seedbed finishing are crucial operations in Sugar Beet. The seedbed must be smooth and have a good tilth, allowing for an excellent seed to soil contact. Sugar Beet seeds are expensive, so we want to put them in optimal germination conditions. New Holland tractors series T6, T7 and T8 can perform all the necessary operation in preparing soil for Sugar Beet.

Sugar Beet is not a very competitive crop with weeds, and it is attacked by many insects and diseases. Therefore, an accurate program of crop protection is essential to achieve satisfactory yields. Spraying is required often during the growing season. New Holland offers a large choice of tires to match all the needs for pulled sprayers operations.

## GUARDIAN

On large acreages, of course crop protection can be more challenging than on medium acreage. The windows for treatments are the same, but acreage is larger. Therefore, timeliness gets critical. To achieve the proper protection results, New Holland proposes to his customers the self-propelled sprayers "Guardian", which deliver required productivity and accuracy in chemicals spraying operations.

## HARVESTING

Harvesting Sugar Beet is a challenging task, because operators must dig and haul huge volumes of roots out of the fields. More, often soil is rather wet, so complicating operations. Therefore, reliable tractors are needed to dig roots with pulled Sugar Beet harvesters and haul the yields off. T8 tractors have all the engine and hydraulic power requested for such heavy tasks.



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