

# Canola or Rapeseed

PRODUCTION GUIDELINES



**CROP HANDBOOK**



# Canola or Rapeseed

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# Production Guidelines







CANOLA OR RAPESEED	
OPERATIONS	AGRONOMICS AND TIMING
Crop rotation	After Sugar Beet, Corn for silage, or Cereals. Should be turned every 3 years. Avoid rotation with sunflower and soybean, as they bring shared diseases with canola
Primary tillage	Minimum tillage (max 15 centimeters) - Plough - Chisel - Heavy cultivator Or sod seeding
Secondary tillage	Harrows, spike harrows, light field cultivators
Planting (Northern Hemisphere)	
Timing	Winter canola: from end of August to middle October
Population at harvest	30-70 plants per square meter
Distance between rows	18-45 centimeters
Quantity of seeds	4-8 kg/ha depending on weight of 1000 seeds (4-7 grams)
Depth	2-3 centimeters
Fertilizing (guidelines, to be adjusted on soil analysis base)	
Nitrogen (N kg/ha)	40 kg/ha at sowing then 80 kg/ha on-top fertilization
Phosphorus (P <sub>2</sub> O <sub>5</sub> kg/ha)	0 required if soils have an ideal Phosphorus content (P>30 ppm) If soils have less than ideal P, administer 50 kg/ha at or before planting
Potash (K <sub>2</sub> O kg/ha)	0 required in good soils (K <sub>2</sub> O>100 ppm) 60 kg/ha in soils with K <sub>2</sub> O<100 ppm
Weed control	
Minimum tillage	Before emergence and Post emergence
Sod seeding	Glyphosate before sowing; post emergence as usual
Pest control	Foresee 2 sprayings against insects
Harvesting	When seeds have a moisture content less than 14%. Dry plants and black grain

RAPESEED PRODUCTION BY COUNTRY	
Country	(Values in Metric Tons)
European Union	21,800,000
Canada:	15,500,000
China:	13,300,000
Others:	8,745,000
India:	6,800,000
Japan:	3,000
<b>WORLD</b>	<b>66,148,000</b>

This month (May 2016) the United States Department of Agriculture (USDA) estimates that the World Rapeseed Production 2016/2017 will be 66.15 million metric tons.

Rapeseed Production last year was 68,23 million tons. This year's 66,15 estimated million tons could represent a decrease of 2,08 million tons or a 3.05% in rapeseed production around the globe.

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		✓		✓	✓	✓		Stamper (420 microns)	Light Rain
VERY COARSE (VC) GREEN				✓	✓	✓		Stamper (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 - Crop Development

## WHY IS IT IMPORTANT?

- As a Rule, **Crop Rotation** practices improve the performances of crops.
- By varying crops in the same season, farmers can spread equipment demand throughout the season, reducing costs while increasing utilization.

Land	Crops	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2,500 Ha	Corn				Plant Corn					Harvest Corn			
2,500 Ha	Canola				Drill Canola			Harvest					
2,500 Ha	Spring Barley		Drill Barley				Harvest Barley						
2,500 Ha	Sugar Beet			Plant Beets					Harvest Sugar Beet				
Utilization Period													

- **Exploitation of soil fertility** is improved, as different crops roots explore different layers of soil and use different nutrients.
- **Structure of soils** improves, because residues from crop roots stay at different depths and residues are also different.
- **Management of weeds, pests, and diseases** get easier because different crops have different pests: canola has common diseases with sunflower and soybean.

- Canola **should not** be planted directly after a canola crop or with only one season's separation.

Risks:

- Blackleg (*Leptosphaeria maculans*)
- Alternaria Black Spot
- Insect
- For any short canola rotation or when planting next to last year's canola field, select a variety or hybrid that is resistant or moderately resistant to blackleg. If canola is grown consistently on short rotations, blackleg may become a problem, even when planting a resistant variety, because of heavy disease pressure.
- Short rotations are also susceptible to Alternaria Black Spot and can cause growth of insect populations/attacks.
- **Increasing the length of rotations** can significantly reduce the threat of Blackleg, Alternaria Black Spot and insect infestations.

- Rapeseed native areal is Europe and North Africa and the plant was eventually cropped for oil in regions where olive was not fit for cultivation. During the Middle Age, people used it for lighting. Seeds' content in oil is 40-45%. Rapeseed can be cropped as a winter or spring crop and in rotation takes the same place of winter or spring wheat, but planting and harvesting are earlier if compared with wheat.
- In temperate climates, most common is the winter crop, when in cold climates (Ural Region of Russia, Sibiria and Canada) the crop is mostly planted in spring. Rapeseed is rather resilient to cold temperature and it's not particularly demanding for soil fertility. Rapeseed has common parasites with other cropped plants; both canola and sugarbeet are affected by nematode *Heterodera schachtii*: canola, sunflower and soybean are sensible to fungi *Sclerotinia sclerotiorum*, so the rotation with these crops must be long (2 or better 3 years). Monoculture of canola is highly risky and not recommended: the crop can return on the same field after four years.



## CANOLA DEVELOPMENT STAGES



1. PRE-EMERGENCE



2. SEEDLING



3. FIRST TRUE LEAVES



4. 7<sup>TH</sup> LEAF - ROSETTE



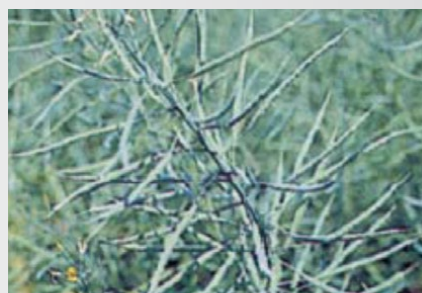
5. 10<sup>TH</sup> LEAF - ROSETTE



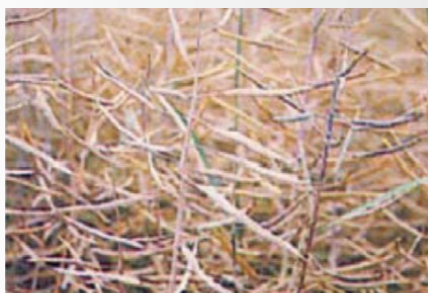
6. LOWER BUDS YELLOWING - BUD



7. FLOWERING



8. FLOWERING COMPLETE - PODS FILLING



9. RIPENING



10. SEEDS

# Tillage

- **Canola seeds are very small and rather poor in vigour:** thus in conventional patterns the finishing of seedbed must be particularly consistent in order to have a good quantity of fine soil, which allows for proper seed to soil contact and quick

germination. Other patterns are possible: canola is broadly cropped also in minimum tillage and no tillage conditions. In any case **sowing depth must be 2 or 3 centimetres:** deeper depth hinders proper emergence of the crop.

## PRIMARY AND SECONDARY

- **Primary Tillage** for spring canola can be carried out in the fall directly following harvesting season.
- **A wide choice of tools** are available for primary tillage:
  - Moldboard Plow
  - Chisel Plows
  - Disk Rippers
  - Offset Disk
- Secondary tillage is carried out before drilling. The goal is to achieve a proper seedbed, which

means fine soil particles between 2-5 mm for good contact between seeds and soil.

- Soil with a rough surface hinders proper seed germination and plant growth, ultimately leading to lost potential yield. This is particularly true for canola, which has very thin seeds.
- Uneven Soil Surface heights result in variable moisture and temperature levels, that affect germination processes.

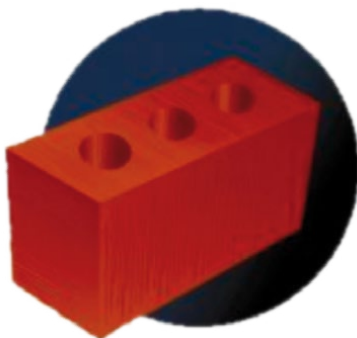
## ECONOMICS

**The financial reward for preparing an optimum seed bed is significant. Cloddy soils will lead to dramatic losses in productive plants.**

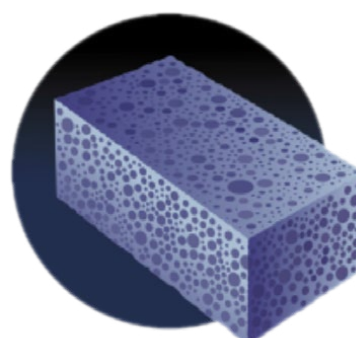
- A good seed bed is important because plant roots require water and oxygen from the soil pore space. The right soil-air-water balance helps limit plant stress during drought periods and enables the plant to fully explore the soil profile for nutrients.

Plants need to use water efficiently and grow strong roots for good anchorage.

- For canola, very smooth even seedbed is ideal.



Restricted Pore Space means an incorrect proportion between minerals, water, and air in the soil: similar to a brick.



Ample Pore Space means a proportion of about half air & half particles: similar to a sponge.



## SOIL STRUCTURE PROBLEM PROBLEMS



PONDING



COMPACTION



HARD PAN



ONLY MACROPOROSITY

### 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.





## CONVENTIONAL TILLAGE

### TOOLS

Chisel plow New Holland ST 830 is an outstanding and extremely reliable tool for primary tillage in a wide range of crops and cropping patterns. It is used also as a seeder, when matched with an air cart. In this case, the machine must be carefully leveled in order to perform a proper job, particularly when seeding small seeds like canola.



## MINIMUM TILLAGE

### FACTS

- **Minimum tillage practice** avoids primary tillage and substitutes it with other patterns which are swifter and cheaper. It is mostly carried out on large farms.
- **Minimum tillage reduces** moisture losses, which is of paramount importance in areas where irrigation is required for crop performance.
- **Capacity of farming** on larger surfaces is improved as well as timeliness of operations when compared with conventional tillage patterns.
- **Passes across the field are reduced** which decreases fuel costs and improves the soil structure while reducing compaction.
- **Residue management** can get more challenging, but minimum tillage practices help protect from soil erosion.
- **Weed control becomes more dependent on herbicides when less tillage is applied.** However, in majority of cases effective herbicides are available for controlling most weeds in conservation tillage systems. Herbicide selection, application rate, accuracy, and timing become more important. Application accuracy is especially important with drilled crops as canola.

# Seeding - Drilling

- Rapeseed cultivars and hybrids are essentially classified as:
  - 1 Winter non alternative cultivars and hybrids**, which need a cold period in order to start the reproductive stages and are mostly planted during fall.
  - 2 Spring cultivars and hybrids**, which need less cold for flowering and are planted in spring. The cycle of these cultivars is shorter and the potential yield is lower.
- Generally, **hybrids are more productive than cultivars and the seed rate per hectare is lower**: seeds are more expensive. Genetic improvements in canola concern the elimination of content in erucic acid in oil ("0" and "00" cultivars), increasing in grains' oil content, resistance to diseases and lodging.
- Planting is usually performed **in rows spaced from 20 to 45 centimetres** in order to give enough room to the branches for developing. We suggest a depth of maximum 3 centimetres, if the soil is moist 2 centimetres is even better. Seeds rate is between 4 to 8 kg per hectare, also depending on the use of varieties or hybrids, which have different weight for 1000 seeds. The goal is to plant 60-80 seeds per square meter for obtaining 40-50 plants at harvest. Concerning timing, **generally in APAC Region, winter canola is planted starting from the end of August to the end of September. Spring rapeseed is planted from end of April to end of May.** If the crop is seriously damaged during the emergence period, minimum threshold to maintain a field is between 5 and 15 plants per square meter at the end of the winter.

## FACTS

- **Sod seeding allows a huge fuel economy improvement** when compared with traditional seeding patterns. If properly carried out with proper machinery, a 50% reduction of costs is possible.
- **Sod seeding** is adept in managing limited water resources, allowing a more strict management of soil moisture and keeping all the advantages of minimum tillage.
- **Weed seeds** are not turned up to surface every year, as in ploughing. This helps to decrease the number of weeds per square meter.
- **Organic matter** is not incorporated in all the layer of soil, but only in surface layers. This improves the soil structure of upper layers where the seed is first drilled: an important part of residues remains on surface, which seriously decreases damages from water and wind erosion.
- **The practice** of sod seeding requires the proper use machinery in the full harvesting process. Either combines must be equipped with straw choppers or a baler must follow the combine to remove the straw from the fields.
- Maintaining a **consistent structure** of soils and fields is a requirement for sod seeding.



### A possible configuration: single pass and four operations.

Special pieces of machinery are required for sod seeding. Initial costs are higher compared to other mechanized solutions, but the result will increase profits and decrease costs over the lifetime of the equipment. (Fuel, Maintenance, Labour).



## MACHINERY & LOGISTICS



Cart is loading seeds into air cart.



Drill: sweeps are not the right tool in canola. Openers are the better choice.

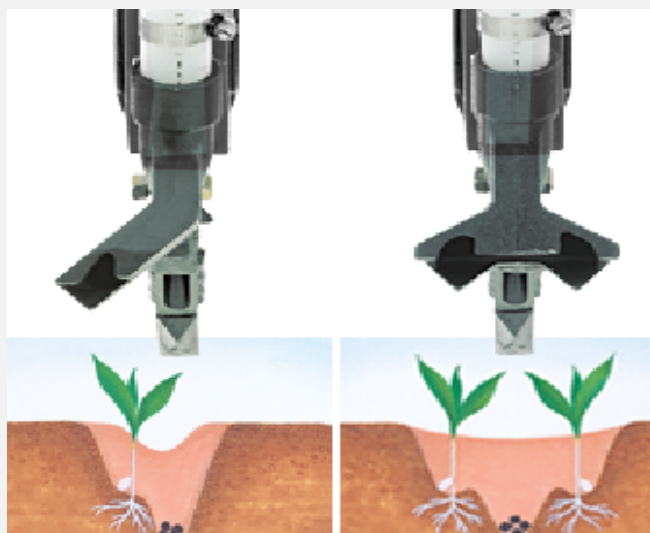
## STEALTH GROUND ENGAGING TOOLS

### Sod seeding PROS:

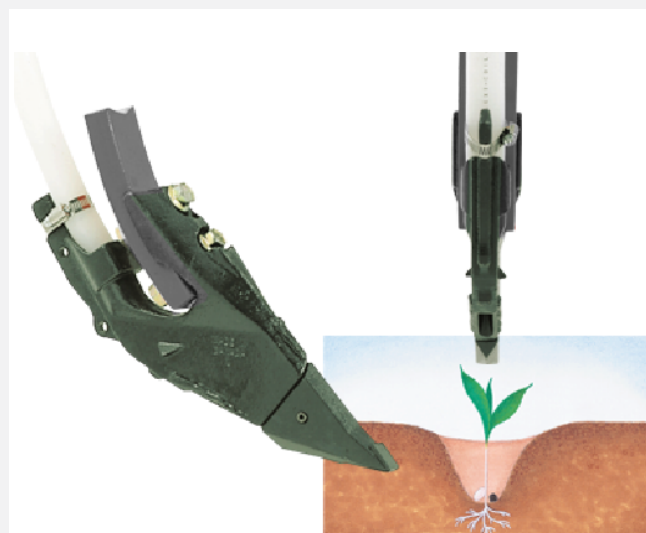
- Minimal moisture losses
- Minimal soil disturbance

### Sod seeding CONS:

- Poor weed control



**Double Shoot:** Seeds and fertilizer are drilled separately. Slightly higher initial cost, but allows the independent control of fertilizer applications (N) reducing fertilizer costs and increasing yield potential.



**Single Shoot:** Seeds and fertilizer are applied at a constant ratio with no control over fertilizer applications. Slightly lower initial cost, but higher lifetime cost due to effects of under/overfertilizing.



Tip and body opener.



## DRILLING

### UNIFORMITY IS EVERYTHING

- **Uniformity in canola** emergence is a crucial factor, due to the small size of seeds and the little endosperm content in nutrients.
- **High yields** require having enough productive plants to utilize available resources. And productive plants require a well-prepared seed bed.
- As a rule, producers should consider **five agronomic drivers** of seed placement accuracy at seeding time. Depending on the type of seed and field conditions, certain drivers may have more or less importance. In canola all 5 point are important:
  1. Proper seed depth
  2. Uniformly correct seed depth across the drill and throughout the field
  3. Good soil-to-seed contact
  4. Uniformly correct soil pressure all around the seed
  5. Accurate seed population
- **Early, even emergence** is one of the most critical elements to attaining maximum yield potential from all crops. The sooner the plant gets out of the ground, the sooner it can develop a more advanced root system and leaf stage to fight off stress factors that are sure to come its way.
- **The sooner plants get out of soil**, the less they will be damaged by soil pests. Also, fast emergence is a good way to avoid fungal damage.
- **Plants that emerge uniformly** and progress at the same rate of development throughout the growing season have a higher yield potential. Uneven emergence introduces inefficiencies and added competition within the stand, which can cause ripening or other related problems.

### BEFORE THE DRILLING TOTAL AREA ABOUT 4000 HECTARES

What is the cost to Plough, Harrow, Fertilize, and Drill 4000 Ha?

### AFTER THE FIRST DAYS OF DRILLING GOOD JOB ALREADY IN FIRST YEAR 2014 CENTRAL RUSSIA

How much money has been saved by using Sod Seeding?



## NO TILLAGE (NO-TILL)

No Tillage is a practice promotes no disturbance of soil resulting in the least moisture losses of any tillage practice. No-Till is carried out using only an opener (knife) or disks drills.



New Holland P2080 and P2085 family of air drills feature a parallel-link system, consisting of an upper and lower arm to ensure even depth placement across varying soil conditions. Patent-pending

variable down-pressure springs apply the right amount of pressure on individual row units to ensure better penetration across varying residue and soil conditions.



# Crop Protection

## SPRAYING FACTS

- **In modern canola production**, crop protection is of paramount importance no matter the tillage practices. The less intensive the tillage strategy, the more important chemical control of weeds is to crop health.
- **Canola is a poor competitor** with weeds in first stages of development or when cool soil temperatures cause slow germination and growth. But canola competes more effectively in warm soils when germination and growth are rapid.
- Once weeds have rooted, farmers can expect up to 1% yield loss for each additional day where weeds are allowed to compete with canola for resources.
- **Management practices** such as thorough seedbed preparation, adequate soil fertility, well-adapted crop variety, and use of good quality seed all contribute to a healthy canola crop that is able to compete effectively with weeds.
- **Weed control should be carried out** with pre-sowing, pre-emergence and on-top spraying. Weeds or/and pests can damage the yield up to the 100%, if not controlled or controlled too late.
- **Pest and insects** are a serious threat for canola crops from a very early stage (seedling) all the way to ripening.
- **Pest control** can be performed by top spraying on high plants. Pests include Armyworm, Caterpillars, Flea beetle, Root maggots, Aphid, Blister beetle.
- **When spraying is needed**, timeliness is more crucial than in other operations. Weeds and pests need to be controlled as soon as possible.
- **Productivity and reliability** are important factors affecting the result of spraying operations.
- **Cost of chemicals** and the negative effect of imprecise treatments emphasize the importance of utilizing precise application systems.
- **Uniformity of droplet size** promotes consistent crop coverage, more effective pest control, and helps to Control Application Drift.
- **Application Drift** can happen when particle size is too small for conditions.
- **Adjustments of pressure and volume** should be varied depending on the target and current weather conditions Example: Weeds vs fungi vs insects.

(North Dakota State University)

## CANOLA PESTS



Adult Nuttall blister beetle,  
*Lytta nuttalli* Say



Cluster of turnip aphids  
*Lipaphis erysimi*  
(Kaltenbach) on canola  
terminal



Damaged canola seedling caused by flea beetle feeding injury



Undamaged seedling

# Fertilization

## FACTS

- As usual, only soil analysis results give precise indications concerning fertilization of the crop. Certainly, **at the end of the cycle, canola lets on the field abundant residue** which contributes to improve organic matter content of soil.
- Some guidelines are possible, considering that following nutrients are required for formation of a yield of 3 tons per hectare:
  - 1 210 kg N
  - 2 75 kg  $P_2O_5$
  - 3 300 kg of  $K_2O$
  - 4 185 kg of  $SO_3$
- About 115 kg N, 35 kg  $P_2O_5$ , 270 kg  $K_2O$  and 125 kg  $SO_3$  return to soil with residue. **Nutrients are mostly absorbed during the period of active growth** between the end of winter and April. Thus, if only the seeds are harvested and removed from the field, a general guideline for fertilization would be:
  - 1 150 kg N per hectare
  - 2 80 kg  $P_2O_5$  per hectare
  - 3 70 kg of  $K_2O$  per hectare
  - 4 70 kg of  $SO_3$  per hectare can be applied with fertilizers containing sulphur, as e.g. ammonium sulphate (20.5% N and 57%  $SO_3$ ), phosphate (19%  $P_2O_5$  and 30%  $SO_3$ ) and potassium sulphate (50%  $K_2O$  and 45%  $SO_3$ ).
- Most commonly, the bulk of Nitrogen is applied in top dressing; only the 30% is applied in pre sowing, in order to help the plant in forming a rosette (8 leaves), which is the plant stage more resistant to cold weather. **Once a rosette has been formed, plant can endure temperatures down to  $-16^{\circ}C$**  without damage. Phosphorus, Potash and Sulphur are generally applied in pre sowing.





# Harvesting

## NORMAL TIMEFRAME: JULY - AUGUST

- Timeliness heavily influences the quality and quantity of production. If harvesting is too early, then seeds damage is possible when threshing and they can have a high content in chlorophyll: more, drying costs will be prohibitive. **If harvesting is late, pods can open and grains fall out**, so causing large losses. Moisture content of seeds of 20% tells that seeds are ripe and harvesting can take place. **A moisture content between 12 and 14% is ideal for harvesting.** If moisture is below 12%, then damage can occur. Realistic yield for winter canola is about 2.5-4 tons per hectare: for spring canola 1.5-1.8 tons per hectare are most common. For storage, moisture content must be 8%.
- Canola should be harvested when grain moisture is between **9 and 14%**. If Drying Facilities are available OR it is a wet harvesting season.
- Direct Cutting is recommended with a Wheat header (both flexible is preferred, rigid is acceptable) or draper header. Varifeed headers are dedicated for canola.
- Varifeed Adjustable Headers are purpose built for canola/rapeseed and small grain, but can also be used for other seeds & beans & pulses.
- Knife position on Variflow headers can be adjusted on the go allowing the combine to adapt to varying crop yields for max capacity.
- Crop should be cut with a swather and formed into a windrow. If Drying Facilities are not available AND it is a dry/moderate harvesting season.
- Crop should be then collected using a Combine with a Pickup Header.



# 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.



## NEW HOLLAND TRACTORS

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



## HIGH POWER TRACTORS

On large and very large farms high power tractors New Holland T.9 deliver outstanding productivity, making possible timeliness operations also in narrow favorable weather windows.



## PRECISION DISK DRILLS

Canola can be sowed in different patterns. When no till is the system, then Precision Disk Drill New Holland P2080 (pulled cart) and 2085 (mounted tank, shown) are the right tools.

Focused on Precision, Durability and Ease of Use, the P2080 and P2085 Disk Drills provide better solutions that will make customers more profitable through better stands and higher yields. These models offer more sizes and options, improved seed placement accuracy, increased productivity, and a decrease in maintenance time for customers. Higher yields begin with the best and most accurate seeding equipment – the P2080 and P2085 drills. Their parallel arm mounted row units provide unmatched depth accuracy, and industry leading 25° total wing flex maintains uniform seed placement over any topography. Direct seeding is the choice way for operating these machines: anyway, P2085 can be applied also in conventional tillage pattern as well as in minimum tillage patterns. P2080 is used in minimum and no till patterns.



## 40, 50, 60 SERIES AIR CARTS

New Holland air carts have proven to be highly precise seed and fertilizers systems. Precise rates of seed and fertilizers are delivered there where they must. When minimum tillage systems are applied, New Holland seeding equipment is an outstanding means to improve both technical & economic goals all around the world, as experience has shown many and many times.





## P2050 AND P2060 AIR DRILLS

New Holland Hoe Drills and precision hoe drills deliver accurate seed and fertilizer placement, making it ideal for seeding different crops on large acreages. A large choice of seeding systems is available (sweeps, openers, knives) as well as fertilization options (single shot or double shot), in order to match agronomical and economic needs of our Customers.



## GUARDIAN™ FRONT BOOM SPRAYERS

Industry leading equalized weight allows for earlier operations when needed. In canola, often insect are a major concern, and timeliness of chemicals application is crucial: the earlier we can spray, the better the result and the smaller the damage to crop. Innovative suspension and high clearance make possible spraying also in late stage of crop's development, which often occurs in canola. Of course, you can choose the volumes of applications and also change them on the run, depending on scouting results concerning insects' presence in different areas of the same field. High accuracy is another outstanding feature of Guardian™ New Holland sprayers.



## HARVESTING COMBINES

New Holland TC, CX and CR Combine Series offer a huge choice in harvesting options. The great New Holland heritage in building combines allows for delivering reliable machinery, starting with simple drum and straw-walker classic TC Combines up to sophisticated twin rotor CR extra powerful series. Residue management gets easy with straw choppers and chaff blowers standard on New Holland machinery. Varifeed headers are particularly suitable for canola harvesting, avoiding losses that occur when using conventional headers.



## WINDROWERS

Not in every area direct combining is possible: weather condition often do not allow for quick ripening of canola, so cutting and swathing becomes necessary. In this case, New Holland windrowers (Speedrower Series), windrowers can deliver an outstanding job. Speedrowers deliver accurate cutting on all terrain, comfortable rides and easy operations in all crops.



AT YOUR OWN DEALER



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Send us an e-mail: [international@newholland.com](mailto:international@newholland.com)



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