# **Crop & Service Guide**

2023 - 24



A BRAND OF MAÏSADOUR

ACT TOGETHER FOR A CHANGING AGRICULTURE

# Dear grower,

Climate change and environmental degradation are an existential threat to all of us, on every continent. At the same time consumers are asking for a more sustainable approach to agriculture. This translates into a lower use of crop protection products, and fertilizers, and more attention to soil quality and biodiversity. As one of the major seed actors in Europe, it makes sense to have a close look at the **EU GREEN DEAL** though.

The Green Deal is a set of policy initiatives aiming to overcome the challenge of climate change and make our food systems more sustainable. Among them, there is the Farm to Fork strategy, which aims to **reduce**, by 2030, the overall **use and risk of chemical pesticides by 50%**, reduce nutrient losses while conserving soil fertility, so therefore reduce the use of fertilisers by at least 20%. And finally, the EU Commission also wants to arrive at a **quarter of the EU's agricultural land under organic farming**.



All this have major impacts on Europe's, and also the world's plant breeding and seed sector. We at MAS Seeds® are already very well advanced with our company purpose ACT TOGETHER FOR A CHANGING AGRICULTURE, in contributing to this transition. MAS Seeds® proposes various agroecological solutions to face those 4 key challenges:

- 1. Carbon & Soil Fertility, adapted cultural practices can help reach a positive carbon balance, protect soil life and increase soil fertility,
- 2. Protein & Energy Autonomy, Producing protein locally on farm is an important part of food sovereignty. Together with renewable energy production it makes an important pillar of agroecology,
- 3. Water & Climate Resilience, Growing crops in water scarcity requires adapted farming systems enhanced by genetic tolerance.
- **4. Biodiversity,** landscape design with pollinators and using genetic tolerance is an efficient measure to reduce chemical inputs.

In concrete, we provide an innovative diversified seed portfolio, genetic innovations for changing climate, seed applied solutions, agro-services that support the EU policies.

Furthermore, we are implementing a Corporate Social Responsibility (CSR) Policy that is 100% aligned with our company purpose. Our **R&D division** has restructured their organization, added an "Agroecological solutions" department and started implementing experiments for future solutions. We are working on **partnerships with universities** that will bring us even further in agroecological transition.

It is safe to say that MAS Seeds® will continue contributing to the agroecological transition to the maximum degree possible, as we are convinced it is the right way to go. The three pillars provide a solid foundation for each of our customers, no matter the country. **Let's ACT TOGETHER for a Changing Agriculture!** 

### **François HARAMBAT**

Head of Marketing & Sustainable Agriculture



AFNOR Certification attests having assessed the contribution to sustainable development according to ISO 26000 within GROUPE COOPERATIF MAISADOUR.

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# ACT TOGETHER FOR A CHANGING AGRICULTURE

### **Our mission**

At MAS Seeds®, our mission is to PROVIDE AN **INNOVATIVE MAIZE & SUNFLOWER PORTFOLIO** FOR CEREAL AND CATTLE GROWERS.

We develop and produce high performing maize and sunflower varieties, and provide a diversified crop portfolio, seed applied solutions and agro-services that contribute to sustainable agriculture.



### AN INNOVATIVE MAIZE & SUNFLOWER **PORTFOLIO**

We created genetics innovations to help our customers to improve their production and face an increasingly difficult climatic and economic environment.



**GRÉEN** 







### Our purpose

Our purpose is ACT TOGETHER FOR A CHANGING AGRICULTURE.

Since 1949, we team up with farmers, distributors and partners to respond to agricultural challenges and contribute to the changing agriculture that will feed the future generations.

Furthermore, we are implementing a Corporate Social Responsibility (CSR) Policy and we received the Responsibility Europe and CSR confirmed labels in 2022.

### Soil Fertility & Carbon

Soil is the most essential non-renewable resource for crop production, and it plays a central role in biodiversity, carbon fixation and storage. At MAS Seeds® we support farmers to implement protective measures:

- Providing a complete cover crops portfolio to generate carbon sinks and improve soil
- Helping field producers to optimize crop operations with AGROPLUS® services

### **Biodiversity**

MAS4 Nutri

the best efficient way

Biodiversity in agroecosystems offers a greater autonomy from synthetic fertilizers and crop protection products to the farmers, thanks to the interactions between plants and soil:

**Protein & Energy Autonomy** 

Increasing protein and feed autonomy is a way to reduce the negative impacts on the

environment, manage economic and climatic

risks thus improve the sustainability of the farms.

We supports farmers to improve feed efficiency of

their forages, from sowing to storage in silos by:

Developing high energy and high protein

Proposing NUTRIPLUS® Services to

species, varieties and mixtures as silage maize GREEN+, special alfalfa varieties and

cultivate, harvest and store the forages in

- Diversify crops to develop pollinators and increase the landscape biodiversity with alfalfa, cover crops, soybean, winter oilseed rape, sorghum and forage mixtures
- Develop high genetic tolerance against diseases like HelioSMART and NORUST for sunflower to reduce chemical inputs

### **Climate & Water Resilience**

The biggest agricultural challenge of the future will be to increase food production while facing water scarcity. We started our agroecological transition by providing several agronomic solutions:

- Breeding resilient genetics against drought as GREEN+ and WATERLOCK for maize
- Selecting adaptable varieties with earlier relative maturity
- Developing a tropical germplasm to improve our temperate maize

**AN AGRO-SERVICES PORTFOLIO TO SUPPORT** 

**PRODUCTION & RESOURCES USE** 

**GROWERS TO OPTIMIZE** 

We develop an attractive portfolio for crop rotation, soil fertility & feed protein autonomy.



MAIZE

















MIXTURES



CEREALS





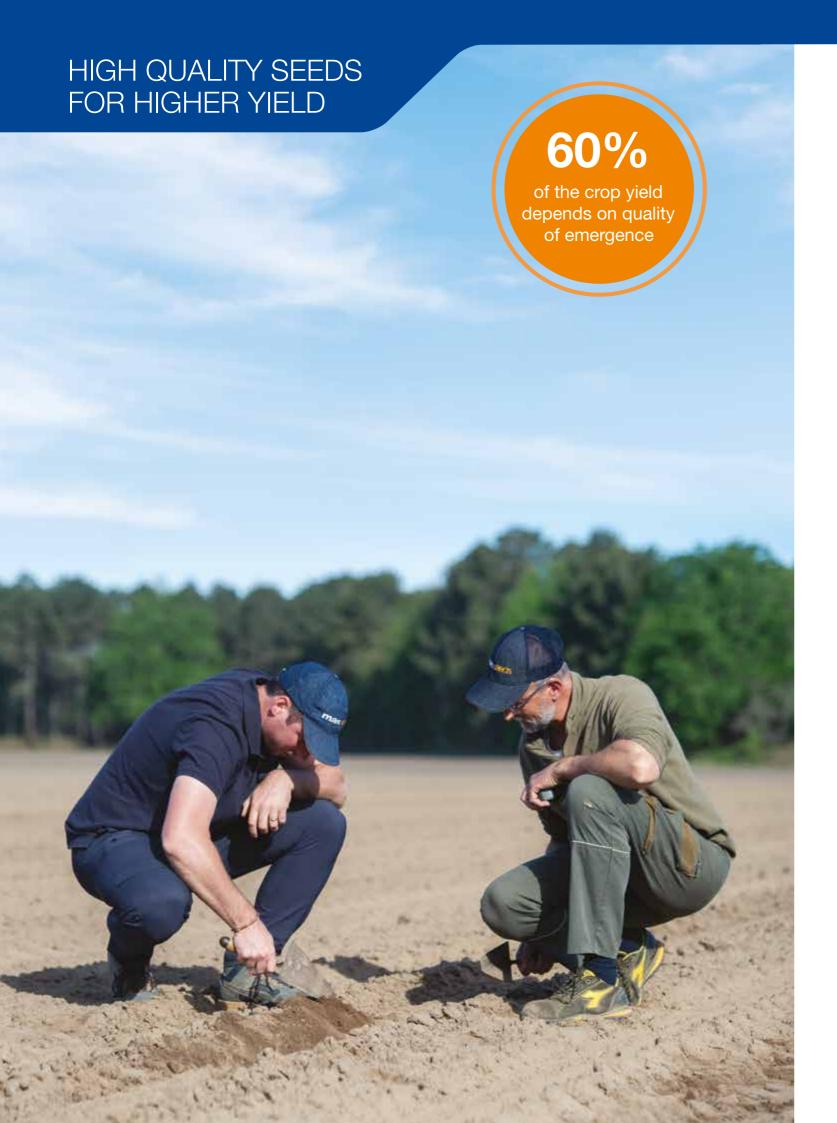




ALFALFA

COVER **CROPS** 

OILSEED RAPE



### MAS Seeds® and seed production:

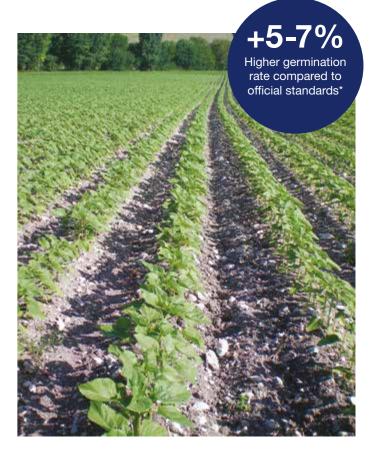
- For MAS Seeds the hybrid seed production has always been a strategic activity.
- With more than 70 years experience we are a European leader in hybrid seed production.

### **High quality seeds**

- Production protocoles adapted to each variety.
- High Tech industrial capacities.
- Demanding quality controls at each step of the process.
- «A la carte» calibration methods to guarantee the best seed homogeneity in each bag.







### Innovation applied to the seed

- A department of experts dedicated to creation and experimentation of solutions applied to the seed.
- A High Tech coating process in our 4 factories.
- A full seed protection.
- Real booster of the germination vigour for a quicker plant development.

### A direct impact on yield

- Better density because of less plant losses.
- Quicker emergence.
- Less small plants, a more homogeneous emergence.
- Better soil prospection for a better use of water and nutrients.
- Steadier yield components.



# ORGANIC SEEDS AT MAS SEEDS®



Organic farmers rely on organic seeds to meet the growing demand for certified organic products. These seeds are essential to the integrity of the supply chain for quality organic food, feed and other products.

Organic farming challenges can be quite different from conventional systems. Seed provides the genetic tools to confront these day-to-day challenges in the field.

### Specific variety selection criteria

- Excellent starting vigor and strong root development.
- Disease tolerance in order to reduce losses through pests and secure yield.
- Management of competitive weeds: rapid soil cover and row closure, robust stems adapted to mechanical weed control.
- Performance, stress tolerance and regularity under all conditions.
- In order to evaluate these achievements, MAS Seeds invests every year in a special Organic test network from Terres Inovia and Arvalis.

### Special production network

We have built a well-functioning network of organic seed producers who follow all the rules and requirements set out in the EU and GNIS specifications. We define a cultivation protocol adapted to the production area to produce every hybrid where the yield potential is the highest.







### Own production facility

MAS Seeds® is ORGANIC certified, and we have a specific production line for organic agriculture seeds.

We renew our accreditation through semi-annual audits by a certified organization (CERTIPAQ Organic).



For over 15 years, MAS Seeds® invested in development and production of organic seeds.



### WE ASKED OUR EXPERT:

# What is special about ORGANIC Seed Production?

The organic production fields are well isolated:

Keeping isolation distances is essential.
 We increased the distance from recommended
 500 m to 700 m to ensure the purity.

The **sowing date** is optimized:

- Not too early, so that weeds have enough time to emerge. We carry out mechanical weed control before the sunflower is sown.
- Not too late, to not endanger the harvest. Also, special attention should be paid to botrytis. It is a criteria for the certification for organic seeds.

The **weeding** is done mechanically. We also conduct trials for innovative solutions and use some organic weed control measures.

Nicolas LABEYRIE

MAS Seeds® Seed Production Expert



### Our organically produced maize and sunflower seeds portfolio:

CROP	VARIETY	TYPE	EARLINESS	EARLY VIGOR	MILDEW	DISEASE TOLERANCE	STRESS TOLERANCE
	MAS 075B BIO	Flint	Very Early	***		****	****
MAIZE	MAS 250F BIO	Flint	Early	****		***	****
WAIZE	MAS 26R BIO	Flint-Dent	Mid-Early	****		***	****
	MAS 43P BIO	Dent	Mid Late	****		***	****
SLINEL OWED	MAS 81K BIO	Linoleic	Early	****	RM9	****	***
SUNFLOWER	MAS 815OL BIO	High Oleic	Early	****	RM9	***	***
	MAS 830OL BIO	High Oleic	Mid Early	****	RM9	***	***

\*\* correct

\*\*\* g

\*\*\*\*

\* excellent

8

# MAIZE VARIETIES AND ADVICES 2023-24



VARIETIES   MATURITY   Silage   Grain   Type of grain   Use   Energy type   GREEN+   WATER-LOCK   Silage   Grain   Optimal   Continued   Continued	mal Limited  000 90 000  000 90 000  000 90 000  000 90 000
NEW         STARLORD         Olita early         180         Flint         Grain         Starchy         105 000         95 000         100 0           NEW         DM0502***         Ultra early         190         Flint         Silage, Biogas, Grain         Starchy         105 000         95 000         100 0           MAS 075B         Ultra early         190         Flint         Silage         Starchy         105 000         95 000           MAS 125C         Very early         220         Dent         Grain         105 000         95 000           NEW         DM1530***         Very early         210         Flint         Silage         Starchy         105 000         95 000           NEW         STANLEY         Early         220         220         Dent         Silage, Biogas         Starchy         105 000         95 000         100 0           NEW         STANLEY         Early         250         260         Flint         Silage, Biogas         Balanced         98 000         88 000           MAS 16B         Early         270         Flint - Dent         Silage, Biogas         Starchy         95 000         88 000         90 00           CHARLOTTA         Early         270	90 000 90 000
MEW         Divided State of the State	90 000
MAS 125C         Very early         220         Dent         Grain         100 0           NEW         DM1530***         Very early         210         Flint         Silage         Starchy         105 000         95 000           MAS 10A         Very early         220         220         Dent         Silage, Biogas         Starchy         105 000         95 000         100 0           NEW         STANLEY         Early         250         260         Flint         Silage, Biogas         Balanced         98 000         88 000           MAS 16B         Early         240         Flint         Silage, Biogas, Grain         Starchy         95 000         88 000         90 00           CHARLOTTA         Early         270         Flint         Silage, Biogas         Balanced         98 000         90 000	90 000
NEW         DM1530***         Very early         210         Flint         Silage         Starchy         105 000         95 000           MAS 10A         Very early         220         220         Dent         Silage, Biogas         Starchy         105 000         95 000         100 0           NEW         STANLEY         Early         250         260         Flint         Silage, Biogas         Balanced         98 000         88 000           MAS 16B         Early         240         Flint         Silage, Biogas         Balanced         100 000         90 000           MAS 250F         Early         270         270         Flint - Dent         Silage, Biogas         Starchy         95 000         88 000         90 00           CHARLOTTA         Early         270         Flint         Silage, Biogas         Balanced         98 000         90 000	90 000
MAS 10A         Very early         220         Dent         Silage, Biogas         Starchy         105 000         95 000         100 0           NEW         STANLEY         Early         250         260         Flint         Silage, Biogas         Balanced         98 000         88 000           MAS 16B         Early         240         Flint         Silage, Biogas         Balanced         100 000         90 000           MAS 250F         Early         270         270         Flint - Dent         Silage, Biogas, Grain         Starchy         95 000         88 000         90 00           CHARLOTTA         Early         270         Flint         Silage, Biogas         Balanced         98 000         90 000	
NEW         STANLEY         Early         250         260         Flint         Silage, Biogas         Balanced         98 000         88 000           MAS 16B         Early         240         Flint         Silage, Biogas         Balanced         100 000         90 000           MAS 250F         Early         270         270         Flint - Dent         Silage, Biogas, Grain         Starchy         95 000         88 000         90 00           CHARLOTTA         Early         270         Flint         Silage, Biogas         Balanced         98 000         90 000	
MAS 16B         Early         240         Flint         Silage, Biogas         Balanced         100 000         90 000           MAS 250F         Early         270         270         Flint - Dent         Silage, Biogas, Grain         Starchy         95 000         88 000         90 0           CHARLOTTA         Early         270         Flint         Silage, Biogas         Balanced         98 000         90 000	00 85 000
MAS 250F         Early         270         270         Flint - Dent         Silage, Biogas, Grain         Starchy         95 000         88 000         90 0           CHARLOTTA         Early         270         Flint         Silage, Biogas         Balanced         98 000         90 000	00 85 000
CHARLOTTA Early 270 Flint Silage, Biogas Balanced 98 000 90 000	00 85 000
NEW DM2522*** Early 270 270 Flint Silage, Biogas Balanced 95 000 85 000	
NEW         MAS 275L         Early         290         Flint - Dent         Silage, Biogas         Starchy         92 000         82 000	
MAS 23M Early 290 Dent Grain 95 0	00 85 000
NEW MAS 282K Early 290 Dent Grain 95.0	00 85 000
HULK         Mid Early         290         290         Flint - Dent         Silage, Biogas         Balanced         92 000         82 000	
MAS 26R Mid Early 280 280 Flint - Dent Silage, Grain Starchy	90,000
MAS 28A Mid Early 280 280 Flint - Dent Silage, Biogas Balanced 95 000 85 000 90 0	00 80 000
MAS 306P Mid Early 300 Dent Grain 95.0	00 80 000
CITADEL Mid Early 340 340 Dent Grain 95 0	70 000
MAS 333T Mid Early 390 Dent Grain 95 0	00 75 000
MAS 431B Mid Early 320 360 Dent Silage, Biogas, Grain Balanced 95 000 85 000 90 0	000 80 000
MAS 448G Mid late 480 Dent Grain 85-95	000 70-80 000
MAS 43P Mid late 450 Dent Grain 90 0	00 85 000
MAS 524A Late 530 Dent Grain 80-90	000 75-85 000
MAS 576N Late 540 540 Dent Grain, Silage 75-85	000 70-80 000
MAS 582D Late 570 Dent Grain 75-85	000 70-80 000
MAS 59K Late 580 Dent Grain 75-85	000 70-80 000
NEW MAS 674L Very late 650 Dent Grain 75-85	000 70-80 000
MAS 765A Very late 700 Dent Silage, Biogas Balanced 95 000 85 000	
SHANIYA         Very late         720         Dent         Silage, Biogas         Balanced         Image: Biogas of the properties of	000 80 000

	A	GRONOM	Υ		DISEASE TOLERANCE							
Early vigor	Dry down	Stay- green	Water stress tolerance	Harvest lodging	Fusarium (stem)	Fusarium (ear)	Hel- mintho	Eye spot	Head smut	Commun smut	VARIETIES	
7	7	7	8	8	8	9	9	8	9	9	STARLORD	NEV
7	7	9	8	9	8	8	8	8	7	8	DM0502***	NE\
8	6	9	8	8	8	9	8	8	9	8	MAS 075B	-
6	9	7	9	9	8	8	7	8	8	8	MAS 125C	-
9	7	7	8	8	8	8	8	8	8	9	DM1530***	NE
7	7	8	8	7	8	9	7	8	8	7	MAS 10A	_
9	6	9	8	8	8	8	8	8	7	8	STANLEY	NE
8	7	8	8	8	8	8	7	9	9	8	MAS 16B	_
8	7	8	8	8	8	8	8	8	7	8	MAS 250F	_
8	6	9	8	9	8	8	8	8	5	8	CHARLOTTA	_
8	6	9	8	8	8	8	8	8	7	8	DM2522***	NE
9	7	7	7	8	8	8	8	8	9	8	MAS 275L	NE
7	8	7	8	8	8	8	9		9	8	MAS 23M	_
9	8	7	8	7	7	7	8		6	8	MAS 282K	NE
8	8	7	7	7	8	8	7	8	7	8	HULK	_
8	8	8	8	8	8	8	9	8	8	9	MAS 26R	_
7	6	8	7	8	8	9	7	8	4	8	MAS 28A	_
8	7	8	7	8	7	8	6		7	7	MAS 306P	_
7	7	7	8	7	8	8	6		8	8	CITADEL	-
8	7	6	8	7	7	7	6		8	8	MAS 333T	_
8	7	8	7	8	8	8	8		8	8	MAS 431B	_
8	7	7	8	8	8	7	8		7	8	MAS 448G	_
8	7	6	8	9	7	8	7		7	8	MAS 43P	_
6	7	8	8	8	8	7	8		7	7	MAS 524A	_
7	7	8	7	8	8	7	8		8	8	MAS 576N	_
8	7	6	7	7	7	7	6		7	7	MAS 582D	_
8	8	7	7	7	7	7	6		7		MAS 59K	-
8	8	8	7	8	8	8	8		8	8	MAS 674L	NE
8	8	7	8	8	8	8	8		8	8	MAS 765A	-
9	7	9	8	8	8	8	8		8	8	SHANIYA	-

1-3 bad | 4-6 average - good | 7-9 excellent

<sup>\*</sup> Silage maturity at 32 % DM

\*\* Grain maturity for 35% H2O for flint, 32% H2O for dent

\*\*\* In registration process



### BREEDING CRITERIAS FOR WATERLOCK HYBRIDS

### **Early flowering**

During flowering stage maize plants are highly sensitive to drought stress. Speed up the flowering time permits to take advantage of water resources available in spring and avoid summer heat waves.

# ad in

### Synchronisation of male and female flowering

Timely synchronisation between silks emergence and pollen shed is critical to ensure proper pollination and kernel number on ear.

### Leaf area index establishment and upkeep

Efficient establishment and maintenance of leaf area, even under drought stress, is a priority to maximize photosynthesis activity.

### Strong root system

Strong and deep root system to explore the soil is essential to improve water uptake by the plant and to delay drought stress damages.

### **IMPROVED PHYSIOLOGICAL RESILIENCE**

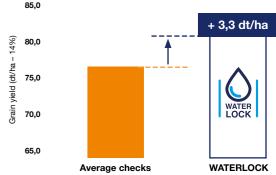
Plants have better capacity to return to a normal activity after a drought stress period.

### Benefits for the farmer

In situations where maize plants have to face short or long period of drought stress, WATERLOCK maize hybrids have demonstrated their yield superiority compared to market competitors. They bring security to the farmer, and a guarantee of profitability in all weather scenarios.

# WATERLOCK – maize hybrids to get the best from each drop!

### WATERLOCK: performance is visible in the field



Data R&D MAS Seeds® Seasons 2012-2020 – fields with drought stress detected

### Investments in agronomy and technology

### A wide maize trial network, rich of diverse weather scenarios

MAS Seeds® is develops its R&D centers in Ukraine, Romania, Russia with local breeding programs. In these regions where water supply is limited, our teams are able to identify accurately the most productive genetic resources.

### A large data collection

- Phenotype data: plant morphology, physiology, yield components.
- Environmental data: climate data, soil water supply, crop management.
- Genotype data: complete genetic screening of all resources involved.

# Modern data analytics methods

Our data scientist team integrates the data collected in the field and in the laboratory, in order to evaluate and predict the drought tolerance of our new coming maize hybrids.



**EARLY** 



# MAS 23M



### **PURE DENT IN EARLY GROUP**

PERFORMANCE IN ALL **SITUATIONS** 

suitable for high and low potential

- VERY SAFE AGRONOMY short plant, good disease profile
- **DENT GENETIC WITH EARLY FLOWERING**

low harvest moisture and widely adapted

### **CHARACTERISTICS**

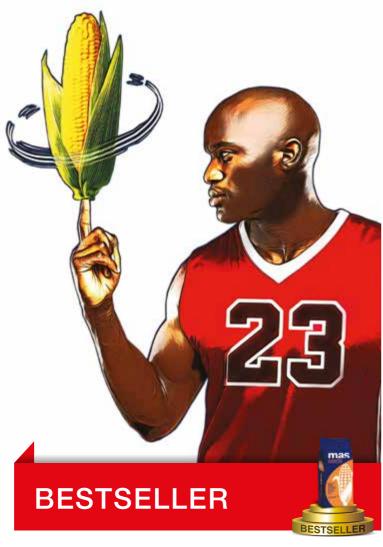
Plant height: Short Ear insertion: Low Dent Type of grain: Nr of rows: 14-16 30-34 Nr of grains per row: TKW: 290-310 g 875°C Flowering (°C): 1730°C Grain maturity 32% H₂O:

Temperature sums, base 6°C

### **AGRONOMY**

Early vigor:	7
Stay green:	7
Dry down:	8
Helminthosporium:	9
Fusarium (ear):	8
Lodging:	8
Drought tolerance:	8

1-3 sensitive | 4-6 medium - good | 7-9 tolerant | excellent



### **GROWING RECOMMENDATIONS**

	Optimal conditions	Limited conditions
Adaptation	++++	++++
Density (Grain Pl/ha)	95 000	85 000

LATE

# MAS 59K



### THE BALANCED YIELD SOLUTION

- HIGH YIELD POTENTIAL in all growing situations
- BALANCED PLANT to secure the harvest
- STRONG EARLY VIGOR to secure crop installation

### **CHARACTERISTICS**

Plant height:	Medium
Ear insertion:	Low
Type of grain:	Dent
Nr of rows	16-18
Nr of grains per row:	43-45
TKW:	345 g
Flowering (°C):	1015°C
Grain maturity 32% H <sub>2</sub> O:	2040°C

Temperature sums, base 6°C

### **AGRONOMY**

Early vigor:	8
Stay green:	7
Dry down:	8
Helminthosporium:	6
Fusarium (ear):	7
Lodging:	7
Drought tolerance:	7

1-3 sensitive | 4-6 medium - good | 7-9 tolerant | excellent

MID LATE



# MAS 448G

### STRONG AND YIELDY

- HIGH YIELD PERFORMANCE on FAO 400 market
- SECURE PLANT QUALITY top agronomy with good diseases profile
- SHORT AND STABLE PLANT

### **CHARACTERISTICS**

Plant height:	Short
Ear insertion:	Low
Type of grain:	Dent
Nr of rows:	16
Nr of grains per row:	34-36
TKW:	320 g
Flowering (°C):	980°C
Grain maturity 32% H₂O:	1960°C

Temperature sums, base 6°C

### **AGRONOMY**

Early vigor:	8
Stay green:	7
Ory down:	7
Helminthosporium:	8
usarium (ear):	7
_odging:	8
Orought tolerance:	8

1-3 sensitive | 4-6 medium - good | 7-9 tolerant | excellent



### **BREEDING CRITERIAS**

Harvesting high-quality silage at correct maturity is a major objective for the farmers in order to ensure the feeding of their dairy cows. Milk production is closely linked to the quality of harvested and stored silage.

In addition to dry matter (DM) yield, feed value and starting vigour, MAS Seeds® maize silage R&D has worked for 15 years on drought tolerance of plants. GREEN+ portfolio is the result of this research.

### KEY RESEARCH AXES OF MAS SEEDS® SILAGE R&D PROGRAM:

- DM yield/ha
- Feed value (starch & digestibility)
- GREEN+\*
- Starting vigour

\*GREEN+ is defined as genetic ability of a variety to delay maturity of leaves and stems, and so maintain their photosynthetic area active for longer period.

### **Characteristics and advantages of GREEN+ hybrids for farmers:**

# HARVEST

- Good stay-green of the plant
- More flexibility to harvest
   +5 to 10 days\*
- Better organisation of harvest planning



- More soluble sugars in the plant
- Better conservation in silo
   +3% of green forage grain\*
- Quicker start of fermentation and pH decrease



- Slower evolution of grain dry matter
- Higher valorisation of starch
   +5% digestible starch\*
- Grains easier to crash

\*Source: MAS Seeds® trial results in mini clamps – 2017 & 2018.

Source: MAS Seeds® trial results in mini clamps – 2017 & 2018.





# MAS 250F



### **GOOD YIELD IN ALL CONDITIONS**



- VERY GOOD YIELD in all conditions
- HIGH LEVEL OF STAY GREEN to secure harvest and conservation
- GOOD FEED VALUE thanks to a good level of starch

### **CHARACTERISTICS**

Plant height: Medium - High Medium Ear insertion: Flint - Dent Type of grain: 16 Nr of rows: Nr of grains per row: 32-34 850°C Flowering (°C): 1460°C Silage maturity 32% DM: Grain maturity 35% H2O: 1750°C

Temperature sums, base 6°C

### **AGRONOMY**

Early vigor:	8
Stay green:	8
Dry down:	7
Helminthosporium:	8
Fusarium (ear):	8
Lodging:	8
Drought tolerance:	8

1-3 sensitive | 4-6 medium - good | 7-9 tolerant | excellent

### **FEED VALUE**

Starch: dNDF: Energy:



### **GROWING RECOMMENDATIONS**

	Optimal conditions	Limited conditions
Adaptation	++++	++++
Density (Silage Pl/ha)	95 000	85 000

MAS 250F is a voluminous plant with large leaves adapted in many situations and also in cold area thanks to its good behavior in stressful conditions.

The hybrid has a good stay green, it secures the quality of silage harvest and conservation.

### **VERY EARLY**



# MAS 10A



### THE MIXT PERFORMANCE



- **DOUBLE PERFORMANCE** high yield in silage and grain
- ADAPTATION with superb ability to build regular cobs in any condition
- HIGH DISEASE RESISTANCE to fusarium, helmintosporium and eyespot



### THE STAR OF THE FUTURE

NEW

VERY GOOD LEVEL **OF DIGESTIBILITY** 

**VERY EARLY** 

- VERY GOOD STAY GREEN
- HIGH SILAGE POTENTIAL

### **CHARACTERISTICS**

Plant height:	Medium - Short
Ear insertion:	Medium - Low
Type of grain:	Flint
Nr of rows:	16-18
Nr of grains per row:	24-28
TKW:	260-280 g
Flowering (°C):	770°C
Silage maturity 32% DM:	1340°C
Grain maturity 35% H2O:	1585°C

Temperature sums, base 6°C

### **AGRONOMY**

Early vigor:	7
Stay green:	8
Dry down:	7
Helminthosporium:	7
Fusarium (ear):	8
Lodging:	7
Drought tolerance:	8

1-3 sensitive | 4-6 medium - good | 7-9 tolerant | excellent

### **FEED VALUE**

Starch:	
dNDF:	
Energy:	

### **CHARACTERISTICS**

Plant height: Medium Ear insertion: Medium Flint Type of grain: 16-18 Nr of rows: 28-32 Nr of grains per row: TKW: 330-340 g 770°C Flowering (°C): Silage maturity 32% DM: 1290°C Grain maturity 35% H2O: 1290°C

Temperature sums, base 6°C

### **AGRONOMY**

Early vigor:	7
Stay green:	7
Dry down:	7
Helminthosporium:	9
Fusarium:	8
Fusarium (ear):	9
Lodging:	8
Drought tolerance:	8

1-3 sensitive | 4-6 medium - good | 7-9 tolerant | excellent

### **FEED VALUE**

Starch:	
dNDF:	
Energy:	







# STANLEY



### THE BEST DIET FOR YOUR COW

- GOOD PERFORMANCE IN STRESS CONDITION
- VERY GOOD STAY GREEN **AND EARLY VIGOR**
- GOOD FEED VALUE a top agronomy and tolerance to diseases

### **CHARACTERISTICS**

Medium - High Plant height: Ear insertion: Medium Flint Type of grain: 16 Nr of rows: Nr of grains per row: 28-32 TKW: 320-330g 840°C Flowering (°C): 1440°C Silage maturity 32% DM: Grain maturity 35% H2O: 1700°C

Sum of temperature in °C based on AGPM

### **AGRONOMY**

Early vigor:	9
Stay green:	9
Dry down:	6
Helminthosporium:	8
Fusarium (ear):	8
Lodging:	8
Drought tolerance:	8

1-3 sensitive | 4-6 medium - good | 7-9 tolerant | excellent

### **FEED VALUE**

Starch: dNDF: Energy: **EARLY** 



# CHARLOTTA

### A TREAT FOR THE COWS



**ELITE YIELD POTENTIAL** the strongest in difficult situation



TOP AGRONOMY good early vigor and healthy plant

**■** GREEN+ GENETICS ensures a flexible harvest window and good conservation of silage

### **AGRONOMY**

Early vigor:	8
Stay green :	9
Dry down:	6
Helminthosporium:	8
Fusarium (ear):	8
Lodging:	9
Drought tolerance:	8

**VERY LATE** 



# SHANIYA

**BIG PLANT FOR SILAGE** 



- **■** GOOD LEVEL OF YIELD in all potential conditions
- **■** GOOD FEED VALUE thanks to the digestibility of fibers
- GOOD CROP ESTABLISHMENT

### **AGRONOMY**

Early vigor:	9
Stay green :	9
Dry down:	7
Helminthosporium:	8
Fusarium (ear):	8
Lodging:	8
Drought tolerance:	8

1-3 sensitive | 4-6 medium - good | 7-9 tolerant | excellent

# Silage maize - Nutritional quality & Energy profile

### SFI FCT A SII AGE VARIFTY SUITABLE FOR YOUR **CATTLE DIET**

The nutritional quality of silage varieties is in the heart of our silage maize breeding program. The energy in the maize silage comes from the starch and the fiber digestibility of stem and leaves. MAS Seeds® has determined 2 different energy types to categorize maize silage varieties, depending on the dominant source of the energy:

- Balanced energy varieties
- Starchy energy varieties



### Principle of the approach

All MAS Seeds® silage varieties are analyzed for their nutritional quality and the ratio of their fiber and starch energy at harvest between 32 and 35% DM. We then categorize varieties by their energy profile and we recommend them depending on the diet practiced by the cattle farmers.



Practiced diet	Maize silage dominant	Grass and alfalfa dominant
Maize ratio	More than 70% maize	Less than 70% maize
Recommended maize silage profile	<ul><li>Need fiber digestibility in maize</li><li>No excess starch</li><li>Acidosis risk management</li></ul>	<ul><li>Need energy concentration</li><li>Quick available energy</li><li>High level of starch</li></ul>
Feeding Period	Late Autumn - Winter	Spring - Summer - Early autumn

Silage Energy profile

Use



**BALANCED** 



STARCH **ENERGY** 

Can be supplemented with energy concentrates: **Advices** Grain or cereal Maize cob mix

- It combines excellently with our ALFALFA varieties and FORAGE mixtures
- Limit additional source of starch (acidosis risk)

### Higher methane production with MAS Seeds® biogas hybrids

Maize is the main substrate ( ~ 50-60%) for the most biogas plants as it is a unique crop with the highest carbon efficiency per hectare.



### The main criteria for highest methane production/ha:



### Massive yield in dry matter (DM)



Methane production in liter per kg of DM.

We observe in our network of biogas trials that the production of methane/ ha is directly linked to **DM yield.** This is the key criteria of selection of our biogas varieties in MAS Seeds®, respecting a minimum of 32% of DM to ensure the best quality of plant.



MAS Seeds® research is also focused on secondary parameters:

### High stay green

- · to secure the harvest window
- to have a quicker fermentation on the silo and a better conservation of the quality.

Good fat content: Increase biogas production.

Good level of hemicellulose for a better retention time in the digester.



### **OUR BIOGAS SEED PORTFOLIO**

VARIETIES	Maturity	Туре	Biogaz/ha yield	"Biogaz Index (RATH Formule)"	Stay green	Fat	Hemicellulose
MAS 10A	Very early	Flint	***	***	****	***	****
MAS 195P	Early	Flint	***	****	***	***	***
STANLEY	Early	Flint	***	****	***	****	****
MAS 250F	Early	Flint - Dent	****	***	***	****	***
CHARLOTTA	Early	Flint	****	***	***	****	***
MAS 26R	Mid-early	Flint - Dent	****	***	***	****	***
MAS 431B	Mid-early	Dent	****	***	***	***	***
MAS 765A	Late	Dent	****	***	***	****	***
SHANIYA	Late	Dent	****	***	***	***	***

### High moisture maize for animal feeding

Maize is an excellent source of energy for animals and can be harvested at different maturities depending on the final use.

High moisture maize (HMC) is a farmland grown feed resource, which increases farm sustainability by limiting purchasing of off-farm feeds, transport and cost of energy for drying. It can be ensiled or stored in oxygen-limiting storage structures for a natural conservation.

The advantages in using HMC are numerous for pigs, dairy cows, beef, sheep and ducks: nutritive, economic and organisational.

### Our advices to take the best profit from high moisture maize

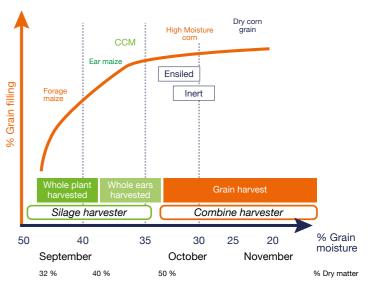
The main target is to guarantee a healthy maize crop and avoid mycotoxins development due to fusarium:

- harvest before November 1st (select hybrids with an adapted maturity)
- · destroy and bury harvest residues
- · control grain borers.





### The different harvesting methods of maize



# Advantages of high moisture

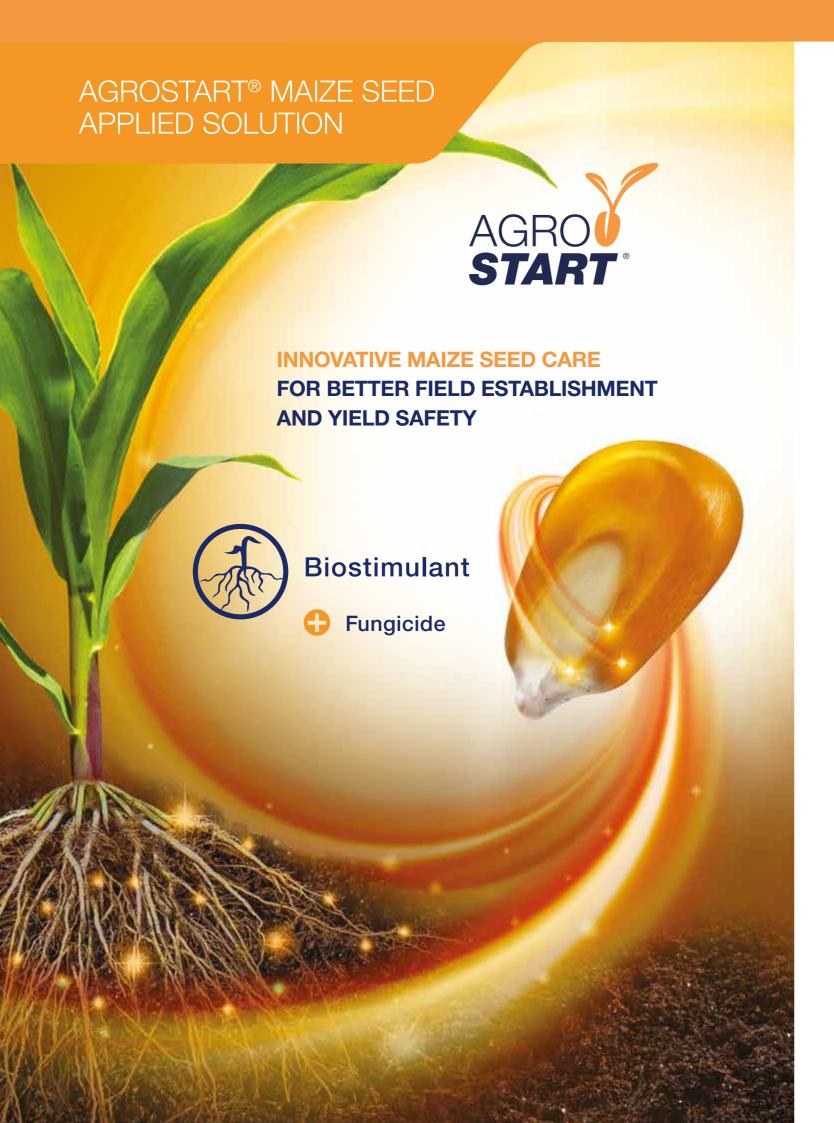
- 1. No drying cost
- 2. A source of quicky digestible starch
- 3. A multipurpose feed
- 4. An efficient use of maize grown on farm.
- 5. An adapted and easy form of storage.



### MAS Seeds® maize varieties for high moisture maize use

Each MAS Seeds® maize hybrid is evaluated by our R&D teams in our European trial network. Following characteristics are considered to put one variety in high moisture portfolio.

VARIETIES	Maturity	Туре	Fusarium	Ease of grinding	Feed value	Protein	Quality of fat
STARLORD	Very early	Flint	****	***	****	***	****
MAS 125C	Very early	Dent	****	***	***	***	***
STANLEY	Early	Flint	****	**	***	***	***
MAS 23M	Early	Dent	****	***	***	***	***
MAS 448G	Mid-late	Dent	****	****	***	***	***
MAS 59K	Late	Dent	****	***	***	***	***
MAS 78T	Very-late	Dent	****	***	****	***	***
MAS 78T	Very-late	Dent	****	***	****	****	****



# AGROSTART®: MORE THAN A SEED TREATMENT, IT IS AN INNOVATIVE TECHNOLOGY!

### Innovative formulation to boost and protect plants in all environments

The innovative AGROSTART standard formulation for stronger and well protected seedling.

Two advanced formulations for environments with higher pest pressure, composed with the standard formulation and complementary solutions.



STANDARD FORMULATION

- Biostimulants: a new humic acid formulation to improve the absorption of nutrients available around seedling.
- Fungicide: prevents damage during the early growth phase from fungus and secure the emergence.





### ADVANCED FORMULATION FOR SOIL INSECT PRESSURE

- Biostimulant and fungicide standard formulation.
- Insecticide (FORCE® 20 CS): protects against the principal soil insects as wireworms.



### ADVANCED FORMULATION FOR BIRD PRESSURE

- Biostimulant and fungicide standard formulation.
- Bird repellent (KORIT®).





### Benefits at field establishment and harvest



### Boost and protect the seedling for a better emergence:

- Quicker and more regular emergence
- Higher emergence rate in cold conditions (+ 5% of raised plants)
- Better roots exploration and nutrient absorption



### Improve yield in all situations, especially in cold conditions at emergence:

- + 3% Yield in average\*
- + 11% Yield in cold conditions at emergence\*

### TROPICAL MAIZE

### **Tropical maize acquisition**

In 2019, MAS Seeds® purchased a tropical maize program, to address the more than 30 millions of non-GMO hectares of hybrids that are grown in sub-tropical and tropical areas in the world. With a breeding station in Mexico original country of maize domestication and its counterpart in Ivory Coast, MAS Seeds® brings genetic diversity into its programs and enlarges its maize products' portfolio available for the myriad of environments which exist worldwide.



### An innovative portfolio

There is a large diversity of markets in subtropical and tropical countries. Nevertheless, hybrids need to demonstrate common abilities in these growing areas: **tolerance to heat/limited drought periods and diseases pressure**. Our MAS Seeds® portfolio combines these assets to propose a range of products very stable in terms of yield across the different environments and weather conditions they face.

Our tropical maize portfolio compiles yellow and white maize hybrids, usable for grain or silage, to cover farmers' requirements: from robust plants suitable for rainfed cultivation to strong hybrids built for intensive-high inputs agriculture. Their harvest can be used for many purposes: human consumption, animal feeding and industry.

		USE AND CARACTERISTICS			SOWING DENSITY (grains/hectare)			
VARIETIES	MATURITY	Type of grain	Use	Energy type	Silage - Optimal	Silage - Limited	Grain- Optimal	Grain - Limited
MASTROP 144	Tropical	Orange Dent	Grain				90,000	85,000
MASTROP 143	Tropical	Orange Dent Flint	Grain Silage	Fast	95,000	85,000	90,000	85,000
MASTROP 103	Tropical	Orange Flint	Grain Silage	Balanced	90,000	80,000	85,000	70,000
MASTROP W43	Tropical	White Dent Flint	Grain Silage	Balanced	95,000	85,000	90,000	80,000

### World climate zones



### **Perspective of deployment**

The products of the MAS Seeds<sup>®</sup> tropical portfolio have been tested for several years now in Mexico and West Africa. Since then, tropical maize sales have been launched in a positive dynamic in Mexico and Ivory Coast, with active promotion in Ghana and prospection in Nigeria & Benin.

This adaptation brings ambition to expand our product range and develop our sales in our new markets, particularly in subtropical and tropical areas of Africa, Asia and America.

_								
		OLERANCE	AGRONOMY					
VARIETIES	Eye spot	Hel- mintho	Fusarium (ear)	Fusarium (stem)	Stay- green	Dry down	Early vigor	
MASTROP 144	7	8	7	7	6	8	8	
MASTROP 143	7	8	8	7	9	8	9	
MASTROP 103	7	9	8	8	7	9	8	









MASTROP 144



YELLOW MAIZE

**VARIETY** 

**GRAIN** 

THE HIGH POTENTIAL

GOOD ADAPTABILITY

in varied conditions

has demonstrated adaptability skills

A DENT SMOOTH & FLOORY

cattle feed and poultry (rich in flour)

and a quick dry down to harvest early

**GOOD YIELDS ON FIELDS** 

these characteristics make it suitable for

0

YELLOW MAIZE



# MASTROP 143

# A POWERFUL, STABLE AND REASSURING VARIETY

FOR ALL YOUR USES a 'all-terrain' plant, well covered ears and a quality yellow grain

A PROFITABLE VARIETY MASTROP143 is suitable for food uses and cattle feeding

STRONG DISEASES TOLERANCE a variety tolerant to leaf diseases that will not dry out prematurely





### **CHARACTERISTICS**

Plant height: 2,7 m

Ear insertion: 1,2 m

Grain Type: Yellow - Dent

Flowering date: 51-78 days

(depending on environment)

Fusarium: 7
Helminthosporium: 8
Lodging: 7
Number of rows: 16-18
Number of grains/row: 36-38
TKW (15% moisture): 330 g

### **ADAPTABILITY**

Optimal conditions Limited conditions

### CHARACTERISTICS

Plant height: 2,8 m Ear insertion: 1,2 m

Grain Type: Yellow - Dent - Flint

Flowering date: 51-74 days (depending on environment)

Fusarium: 8
Helminthosporium: 8
Lodging: 8
Number of rows: 16-18
Number of grains/row: 36

TKW (15% moisture): 330-360 g

### ADAPTABILITY

Optimal conditions Limited conditions

ORANGE FLINTY MAIZE



# MASTROP 103

# GOOD PROFIT FOR ALL OCCASIONS

FOR ALL TYPES OF FIELDS better in early planting, MASTROP 103 is a maize hybrid adapted to all situations and soil types

STABLE AND RUSTIC with MASTROP 103, I secure my yield and my profitabilty

A VERY NICE GRAIN elongated cob, smooth and orangey, good nutritional value for food and industrial use (gritz, poultry, farming, brewery)





### **CHARACTERISTICS**

Plant height: 2,6 m

Ear insertion: 1,2 m

Grain Type: Orange - Flint

Flowering date: 53-80 days (depending on environment)

Fusarium: 8
Helminthosporium: 9
Lodging: 7
Number of rows: 14-16
Number of grains/row: 39-40
TKW (15% moisture): 330-360 g

### **ADAPTABILITY**

Optimal conditions Limited conditions

WHITE MAIZE



# MASTROP W43

# THE BEST OF WHITE MAIZE FOR YOUR BEST FIELDS

GOOD GRAIN QUALITY its grain has a very good quality, rich in flour and with a very nice white color

A WELL-BALANCED PLANT nice ear, beautiful plant, stable and well developed

AN ATTRACTIVE YIELD POTENTIAL planting for the best harvest potential





### **CHARACTERISTICS**

Plant height: 2,8 m

Ear insertion: 1,3 m

Grain Type: White - Dent

Flowering date: 57-80 days

(depending on environment)

Fusarium: 7
Helminthosporium: 7
Lodging: 7
Number of rows: 14-16
Number of grains/row: 38-40
TKW (15% moisture): 330-360 g

### **ADAPTABILITY**

Optimal conditions Limited conditions

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# SUNFLOWER VARIETIES AND ADVICES 2023-24

SVIVE
TAME

		HARVEST	FLOWERING	USE AND CARACTERISTICS								DENSITY nectare)
	VARIETIES	MATURITY	MATURITY	Oil type	Oil content	Oleic acid content	Herbicide tolerance	Broomrape tolerance	Helio- SMART	NORUST	Optimal conditons	Limited conditions
NEW	DT3202CP*	Early	Early	Linoelic	44-45%		Clearfield® Plus	E			65-68 000	55-60 000
NEW	DT7002*	Early	Early	Linoleic	43-45%			G			65-68 000	55-60 000
	MAS 804G	Early	Early	Linoleic	44-45 %			G			65-70 000	50-60 000
NEW	MAS 817P	Early	Early	Linoleic	43-45%			G			65-70 000	50-60 000
	MAS 83SU	Early	Mid Early	Linoleic	45-47%		Express® SX	E			65-68 000	50-55 000
	MAS 85SU	Mid Early	Mid Late	Linoleic	46-47%		Express® SX	Е			70 000	65 000
	MAS 920CP	Mid Early	Mid Early	Linoleic	43-45%		Clearfield® Plus	Е			65-70 000	60-65 000
	MAS 98K	Mid Early	Mid Early	Linoleic	44-45%			Е			65-70 000	60-55 000
NEW	DOVERCLP	Mid Late	Mid Late	Linoleic	45-47%		Clearfield® Plus	G			68-72 000	58-60 000
NEW	DT3402TT*	Mid Late	Mid Late	Linoleic	42-44%		Express SX	Е			65-68 000	50-60 000
	MAS 92CP	Mid Late	Mid Early	Linoleic	44-49%		Clearfield® Plus	Е			68 000	62 000
	MAS 815OL	Early	Mid Early	High Oleic	45-47%	89-91%		/			65-68 000	50-55 000
	MAS 89HOCL	Early	Mid Early	High Oleic	45-47%	87-90%	Clearfield®				75 000	65 000
	DT3301OL*	Mid Early	Mid Early	High Oleic	44-45%	85-86%		/			65-68 000	50-55 000
	MAS 826OL	Mid Early	Mid Early	High Oleic	44-45%	88-90%		/			67-70 000	55-60 000
	MAS 86OL	Mid Late	Mid Early	High Oleic	45-47%	84-87%		E			70 000	65 000
NEW	MAS 908HOCP	Mid Late	Mid Late	High Oleic	44-45%	84-85%	Clearfield® Plus	E			65-68 000	50-55 000
NEW	MAS 9100L	Mid Late	Mid Early	High Oleic	44-45%	87-89%		Е			65-68 000	50-55 000

ADAPTA	ABILITY	AGRONOMY DISEASE TOLERANCE						DISEASE TOLERANCE							
Optimal conditons	Limited conditions	Early vigor	Water stress tolerance	Lodging	Mildiew	Verticillium	Sclerotinia (head)			Phoma	VARIETIES				
••••	••••	7	8	8	RM3	7	8	7	7	7	DT3202CP*	NEW			
••••	••••	7	8	9	RM9	7	9	8	7	7	DT7002*	NEW			
••••	••••	7	8	9	RM9	8	7	9	7	6	MAS 804G				
••••	••••	7	8	9	RM3	7	9	9	7	6	MAS 817P	NEW			
•••	••••	8	8	7	RM9	7	7	6	9	7	MAS 83SU				
••••	••••	8		7	RM9	8	8 8		8	8	MAS 85SU				
••••	••••	8	9	9	RM9	8	9	9	8	8	MAS 920CP				
••••	••••	7	8	9	RM9	9	8	9	9 9 8		MAS 98K				
••••	••	6	7	9	RM9	7	7	9	7	7	DOVERCLP NEW				
••••	••••	7	8	9	RM9	8	9	8	8	7	DT3402TT*	NEW			
••••	••••	7	9	6	RM9	7	8	9	7	8	MAS 92CP				
••••	•••	7	8	9	RM9	8	7	8	7	7	MAS 8150L				
••••	••••	7	7	7	RM9	7	6	7	8	7	MAS 89HOCL				
••••	•••	7	7	8	RM9	7	9	7	7	7	DT3301OL*				
••••	•••	7	7	9	RM9	7	8	9	7	7	MAS 826OL				
••••	•••	8	8	7	RM9	9	8	7	7	8	MAS 86OL				
••••	•••	6	7	8	RM9	8	8	9	8	7	MAS 908HOCP	NEW			
••••	••••	7	8	8	RM9	8	9	8	8	8	MAS 9100L	NEW			



<sup>\*</sup> In registration process



# HelioSMART hybrids have the highest genetic tolerance to the main diseases of sunflower

Managing the risk of diseases is a major issue for sunflower cultivation because diseases can impact the yield by 30% up to 100% depending on the conditions and the intensity of the attacks, and furthermore can decrease the oil quality.

Sunflower diseases have a direct impact on the income of farmers and the performance of sunflower grain collectors. Good agricultural practices must be accompanied by genetic innovations.

HelioSMART hybrids are the results of a breeding program with the best tolerance against main sunflower diseases, in particular mildew, present at the start of the cycle, sclerotinia, which attacks mainly from flowering, and verticillium, the signs of contamination of which appear more at the end of the cycle. This genetic innovation is the result of many years of research and experimentations carried out in area where disease pressure is the highest across Europe.

### HelioSMART hybrids diseases profile

■ Verticillium: 8-9\*\*\*

■ Sclerotinia: <5% attacks\*\*</p>

■ Mildew: RM9 profile\*\*

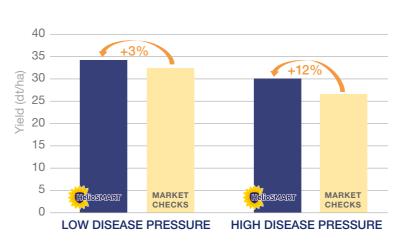
\* 1= bad 9= very good \*\* Based on MAS Seeds® R&D network

### **CONTAMINATION LEVEL (%)**



Results from MAS Seeds® R&D network from 2019 to 2022

### HelioSMART hybrids are selected on their high productivity in all disease situations



Results from MAS Seeds® R&D network 2019-21, average with competitors, HelioSMART hybrids and classic hybrids.

The HelioSMART hybrids have contamination levels that are 3 to 15% lower than the market reference varieties.

This translates into an increase in crop yield up to 12% in high disease pressure situations. In low disease pressure, HelioSMART hybrids offer in average 3% yield bonus compared to market standards.

HelioSMART hybrids ensure high performances whatever disease pressure conditions.

### SUNFLOWER HYBRIDS WITH THE BEST TOLERANCE TO BLACK RUST



### Black rust life cycle and symptoms on sunflower

Black rust is a disease caused by the Basidiomycota fungi Puccinia helianthi spp. Originally discovered in the United Sates, the disease is now widely spread in most of sunflower planted areas all over the world and is a major problem in several regions of Russia and Ukraine.

### Two internodes stage **BBCH32**



### June

After over-wintering in crop residues, telia germinates and the fundi infect sunflower leaves.

**Pycnia:** Yellow-orange spot on top side of lower leaves.

Aecia: orange spots on underside of lower leaves in opposite of pycnia.

### Inclined flower bud **BBCH61**



### **End of June to end of August** Reproductive and spraying phase. Pustules appear after 2 weeks on both sides of leaves and repeat cycle every 10-14 days.

Uredinia: Orange-brown spot with spores on both side of leaves.

### Falls of ligulate flowers **BBCH73**



### **August to harvest**

of sunflower stop reproductive phase and induce the change to overwintering stage (Telia).

Telia: dark brown-black spots without spores.

Cold temperatures or maturity

In high pressure with fungicides: only minimal

### The solutions against black rust

Crop rotation: Respect a delay of 4 years between two sunflowers in the same field.

Plant protection: Fungicides, apply at first symptoms of rust (1% of leaf area infected) to limit further development.

Genetic: Choice of hybrids tolerant to rust.

### MAS Seeds® genetic solution: NORUST hybrids

### NORUST hybrids have the best tolerance against black rust in the market:

For many years, MAS Seeds® have invested to evaluate its hybrids under Black rust pressure.

We use a large range of supports (R&D network, Marketing demo fields, Commercial fields) to characterize the tolerance of each hybrid.

### With NORUST hybrids, you reduce black rust in all situations:

- In low pressure: no visible symptoms.
- In high pressure without fungicides: later appearance of Black rust infection and less impact compared to competitors.
- infection and less impact compared to competitor.



Picture: comparison of MAS 93CP against competitor in high pressure of black rust

### Impact on sunflower crop: up to 80% yield losses



# Black rust induces several impacts on sunflower by pumping

- Increase of transpiration (water losses).
- Decrease of plant nutrients transfer to the grains.
- Acceleration of senescence.
- It can induce huge impacts on sunflower performances, depending on the severity of the attack: 25 to 80% yield losses and 4 to 15% oil content losses.
- The impact on yield is already significant if 1% of leaf area is infected by either Uredinia or Telia.

NORUST	hybrids			
TECHNOLOGY	CLASSIC		Clearfield® Plus Production System for Sunflower	IMISUN HERBICIDE TOLERANT
SUNFLOWER HYBRID	MAS 850B MAS 910OL MAS 81K MAS 96P MAS 86OL	MAS 83SU MAS 85SU DT3402TT* MAS 880SU	MAS 920CP MAS 92CP MAS 93CP MAS 908HOCP	BLADE

<sup>\*</sup> In registration process

### **SUNFLOWER** – Broomrape Management

### BROOMRAPE: A KEY PARASITE TO MANAGE CAREFULLY

Orobanche cumana (english: broomrape) affect significantly final sunflower yield. This parasitic plant, affecting specifically and exclusively sunflower (and some other Helianthus types), is expanded around the Black sea and also in south of Spain and in few regions in France. Fortunately, solutions exist to manage broomrape and reduce his impact on yield. Between herbicide tolerant sunflowers and hybrids genetically tolerant to F, G and G+ races, MAS Seeds® propose a large choice of solutions for farmers. Nevertheless, some basic best practices are important to secure the field and limit the propagation of Orobanche Cumana.

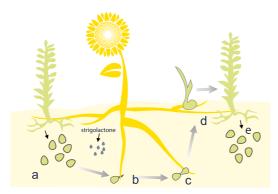


### Orobanche cumana life cycle

Broomrape plant produce thousands of seeds kept in soil many years before emergence (a).

Broomrape seeds germination is stimulated by sunflower: strigolactone released in soil by sunflower roots (b). Fixation on sunflower roots, broomrape grows using sunflower energy and produce seeds (c, d, e).

Choosing adapted sunflower hybrids, broomrape can't emerge and produce new seeds: most effective strategy to avoid increasing number of seeds in fields and develop new contamination areas.



### Cultivation practices under broomrape infestation

### **Before sowing – rotation**

- Identify risky fields
- Implement proper crop rotation: minimum 3 years between 2 sunflower crops in the same field

### Variety choice - cultural operations

- Use sunflower hybrids genetically tolerant to broomrape race identified or use a Clearfield/Clearfield PLUS variety
- Clearfield or Clearfield® PLUS hybrids → use proper herbicide sprayed at maximum advised dosis\*\*
- Choose double protection (hybrid genetically tolerant to broomrape + Clearfield® PLUS) for hardest cases
- Avoid nutrients deficiency in order to have strong sunflower crop

### After harvest

- Harvest orobanche-free fields first & infested fields at the end
- Clean carefully harvesting equipment between each fields
- Bury residues in soil to avoid broomrape seeds dispersion by wind and wild animals

### MAS Seeds® solutions for broomrape infested areas

EARLINESS	CONVENTIONAL	Clearfield Plus Systems de production Tournecol	OPTIMISED FOR <u>EXPRESS™ HERBICIDE</u>
EARLY MID EARLY	JULIUS MAS 804G MAS 817P DT7002*		MDS5123LS*
MID LATE LATE	MAS 91G MAS 90F MAS 96P	DOVER CLP MAS 93CP MDS5523LP*	MAS 880SU

### **HIGH OLEIC SUNFLOWERS**

# HIGH OLEIC SUNFLOWERS – HIGH VALUE CROP FROM GROWER TO ENDUSER

An extra price for farmers, a healthier oil, an useful oil composition for companies, **High Oleic (HO) Sunflowers** all have qualities to seduce the protagonists of the sunflower market.



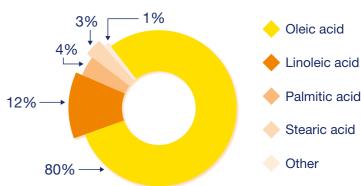
### What is a HIGH OLEIC sunflower?

HO sunflowers are different in oil composition. Contrary to linoleic sunflowers, the oil transformation chain is blocked by enzymes before the full transformation. The transformation from oleic acid to linoleic acid is stopped and the concentration of oleic acid increases and surpasses easily 80% (vs 20% for linoleic sunflowers).

In field, there are none differences in cultivation practices between the two types of sunflower and the oil content is also the same.

For a HO sunflower, **30 days following the flowering** are particularly important to establish the oil content and the oleic acid content.

### High oleic sunflower composition



### Why is it useful to cultivate HO sunflowers?

### 🛑 Health

HO oil contains a high percentage of monounsaturated fatty acid. This fatty acid family permits to reduce the cholesterol content in blood and to struggle against hypertension problems. HO oil is also rich in vitamin E and antioxidants which protect our cells.

### Industry

HO oil has a better stability during the cooking than a classic oil therefore HO oil is very appreciated by agribusiness companies. HO oil is also frequently used in green chemistry companies and can be used like bio lubricants, green ester and biofuels.



### **Environment**

Contrary to palm oil, which comes from far countries and which increases deforestation problems, HO oil is produced in Europe and doesn't require destruction of forests. Today, more and more farmers are launching in organic sunflower cultivation to answer a new demands from customers.



# The Clearfield® Plus Production System for Sunflower











Program

- Researchers and specialists have worked together to develop tailor made, complex herbicide solutions exclusively for the Clearfield® Plus Production System for Sunflower
- New formulations based on the need to provide better and more fl exible weed control to
- Clearfield® Plus Herbicides deliver a consistently increased post emergence efficacy against broadleaf weeds, grasses and Orobanche
- This is based on better uptake, retention an adhesion

### New Herbicide solutions for Clearfield® Plus



### Herbicide Clearfield® Plus at the leaves of the target weeds\*









reduced roll off*	
Clearfield® Plus Herbicides	Basic Formulation

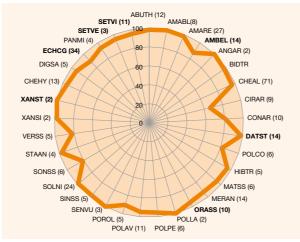
### The Clearfield® Plus Production System for Sunflower development and targets

- Excellent herbicide tolerance
- Robust and reliable weed control
- Flexibility
- Best genetics

Improved selectivity of Clearfield® Plus Hybrids,



Clearfield® Plus Herbicides deliver high level efficacy towards important Sunfl ower weeds including grasses, Ambrosia and Orobanche cumana<sup>a</sup>







SUNFLOWER POST EMERGENCE HERBICIDE

# TAKE THE HEAD OF THE EVOLUTION



Express<sup>™</sup> SX<sup>®</sup> herbicide

MAS Seeds® hybrids are now available with Express tolerance.

A UNIQUE AND MODERN BROAD-LEAVED WEED HERBICIDE TO MAXIMISE SUNFL OWER GROWTH SAFELY

USE PLANT PROTECTION PRODUCTS SAFELY AND WITH RESPONSIBLE CARE. PLEASE ALWAYS FOLLOW THE LABEL WHEN APPLYING PLANT PROTECTION PRODUCTS.

EARLY | LINOLEIC

# MAS 804G



### A STAR IS BORN

### YIELD POTENTIAL

in all conditions

### EARLINESS at flowering and at maturity

BROOMRAPE TOLERANCE an ORO G profile

### **PRODUCT ID**

Maturity: Early Oil Type: Linoleic

### **CHARACTERISTICS**

Flowering: Early Plant height: Medium - Short

Head shape: Slightly convex Head position: Slightly inclined

TKW: 45-55 g Oil content: 44-45 %

### **AGRONOMY**

7 Early vigor: 9 Lodging: Drought tolerance: 8 G Broomrape: RM9 Mildew: Phomopsis: 7 7 Sclerotinia (head): Sclerotinia (stem): 9 8 Verticillium:

1-3 sensitive | 4-6 medium - good | 7-9 tolerant | excellent



### **GROWING RECOMMENDATIONS**

	Optimal conditions	Limited conditions
Adaptation	++++	++++
Density (Grain Pl/ha)	65-70 000	50-60 000

MAS 804G has been developed to deliver high and secure top yields for early sunflowers areas under broomrape pressure. It has been tested during two years in all MAS Seeds® R&D trial locations and the results are very impressive whatever cultivation conditions and weather conditions.

In addition, its ORO G presents an excellent disease and agronomic profile for maximum safety. MAS 804G is the best seller of early linoleic with broomrape tolerance market.

### MID EARLY | LINOLEIC



### EARLY | LINOLEIC



# **MAS 920CP**

**MISTER YIELD** 



### YIELD PERFORMANCE

### SECURITY OF POTENTIAL to fill silos in all situations

HELIOSMART VARIETY

### unlock the potential

to ensure yield from seed to harvest

### **PRODUCT ID**

Mid Early Maturity: Oil Type: Linoleic Herbicide trait: Clearfield Plus

### **CHARACTERISTICS**

Mid Early Flowering: Plant height: High Flat Head shape: Head position: Straight TKW: 55-65 g Oil content: 43-45%

### **AGRONOMY**

Early vigor:	8
Lodging:	9
Drought tolerance:	9
Broomrape:	Е
Mildew:	RM
Phomopsis:	8
Sclerotinia (head):	9
Sclerotinia (stem):	9
Verticillium:	8

1-3 sensitive | 4-6 medium - good | 7-9 tolerant | excellent

# MAS 83SU

### **TECHNICAL ADAPTABILITY** IN EARLY GROUP

### EARLINESS/YIELD POTENTIAL RATIO adaptability in all territories

### HIGH OIL CONTENT

to secure quality

### FLEXIBILITY TO WEED CONTROL

to forget weed problems

### **PRODUCT ID**

Early Maturity: Oil Type: Linoleic Herbicide trait: Express SX

### **CHARACTERISTICS**

Mid Early Flowering: Plant height:

Slightly convex Head shape: Mid erected Head position: TKW: 50-55 q Oil content: 45-47 %

### **AGRONOMY**

Early vigor: 8 Lodging: Drought tolerance: Е Broomrape: RM9 Mildew: 9 Phomopsis: Sclerotinia (head): Sclerotinia (stem): Verticillium:

1-3 sensitive | 4-6 medium - good | 7-9 tolerant | excellent



# AGROSTART®: MORE THAN A SEED TREATMENT, IT IS AN INNOVATIVE TECHNOLOGY!

### Innovative formulation to boost and protect plants in all environments

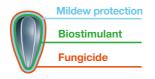
The innovative AGROSTART standard formulation for stronger and well protected seedling.

Two advanced formulations for environments with higher pest pressure, composed with the standard formulation and complementary solutions.



### STANDARD FORMULATION

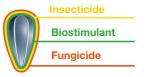
- **Biostimulants:** a new humic acid formulation to improve the absorption of nutrients available around seedling.
- **Fungicide:** prevents damage during the early growth phase from fungus and secure the emergence.
- Mildew protection: Possibility to treat with a mildew protection in accordance with the local regulation, to support genetic protection.





ADVANCED FORMULATION FOR SOIL INSECT PRESSURE

- Biostimulant and fungicide standard formulation.
- Insecticide: protects against the principal soil insects as wireworms.



### Benefits at field establishment and harvest



Boost and protect the seedling for a better emergence:

- Quicker and more regular emergence
- Higher emergence rate in cold conditions
- Better roots exploration and nutrient absorption



**Improve yield in all situations**, especially in cold conditions at emergence:

- + 5% Yield in average \*
- + 7% Yield in cold conditions at emergence\*
- Better yield in more 80% of situations\*

<sup>\*</sup> Compared to standard treatment. Source: MAS Seeds® Research in Seeds Production Data



**WINTER OILSEED RAPE** 



MAS Seeds® offers competitive winter oilseed rape hybrid portfolio covering most known segments in the market

- ALL MATURITIES
- CLASSIC HYBRID
- HERBICIDE TOLERANT
- CLUBROOT TOLERANT
- SAFETY+ GENETIC LABEL

	MATURITY	Y & TYPE		USE A	ND CHAR	ACTERIS	TICS		DI	ENSITY &	ADAP	TATION		AC	GRONOMY	Y			DISI	EASE		1
								'	Density at ha	arvest, pl/m²	Ac	daptation					•	•				
VARIETY	Туре	Flowering	Oil content	Protein content	GLS** content µmoles/g	Herbicide tolerance	TuVY Resistant	SAFETY+	Optimal conditions	Limited conditions	High- norma potenti	al LOW	Early vigor	Stem Elonga- tion	Growth after winter	Pod shattering	Lodging	Phoma	Sclerotinia stem	Leaf ligth- ing spot	Dry stem	VARIETY
VESTAL CL	OGU-INRA	Early	42-44%	37-39%	15-17	Clearfield®	- 7	- /	30-35	30-40	•••	••••	6	6	Early	8	7	7	8	7	7	VESTAL C
SIMONA	OGU-INRA	Mid early	42-44%	34-37%	13-15	-	-	-	30-35	30-40	•••	••••	7	8	Mid-late	9	7	7	7	5	6	SIMONA
MIRANDA	OGU-INRA	Mid early	41-43%	34-37%	15-17	-	- /	-	25-35	30-40	•••	••••	7	8	Early	9	8	7	8	8	9	MIRAND
KOMBIA	OGU-INRA	Mid early	42-44%	34-36%	15 -17	-	-		30-40	35-40	••••	•••	8	9	Mid-Early	9	8	8	7	7	7	KOMBIA
COLUMBIA	OGU-INRA	Mid late	42-44%	34-36%	17-19	-	-		25-35	35-40	•••	••••	9	7	Mid-late	9	9	8	8	6	8	COLUMB
DC2191*	OGU-INRA	Mid late	41-43%	36-38%	13-15	-			25-35	30-40	••••	•••	8	8	Mid-late	9	9	8	8	8	8	DC2191

<sup>\*</sup>In registration process
\*\*Glucosinolates

Avoid

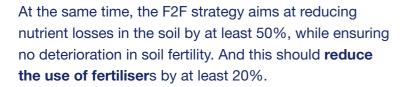


<sup>1-4</sup> Sensitive | 4-5 Average | 6-7 Good | 8-9 Excellent

# RESEARCHING AGROECOLOGICAL SOLUTIONS FOR OILSEED RAPE AT MAS SEEDS®

**Farm-to-Fork European strategy** (F2F), which is considered at the heart of the **Green Deal**, aims at **reducing** by 50%:

- a) the overall use and risk of chemical pesticide;
- b) the use of hazardous pesticides.







Aligning with these F2F objectives, MAS Seeds® has launched a dedicated **research program for agroecological solutions** in oilseed rape (OSR). This research aims to boost rapeseed agroecosystem to ensure yield security while respecting the objectives of the European Green Deal and the new Common Agricultural Policy 2023-2027 (CAP).

Name of trials	Objective	How ?
SAFETY+	Limit use of insecticide in autumn.	Select hybrids with combined characteristic that mitigate impact of autumn insects on the yield.
Association of 2 hybrids	Limit use of insecticide in spring.	Associate the hybrid of interest (90%) with an earlier flowering one (10%) that will attract pollen beetles and thus reduce their impact on the yield of the hybrid of interest.
Companion plants	Limit use of insecticide in autumn and reduce nitrogen fertilisation by 30 kg/ha.	Associate OSR with legumes which will participate in its fertilization and have confusing effect on insects during the fall.
Nitrogen efficiency	Reduce nitrogen fertilization.	Select hybrids with a better use of nitrogen with less yield loss in low nitrogen situation.

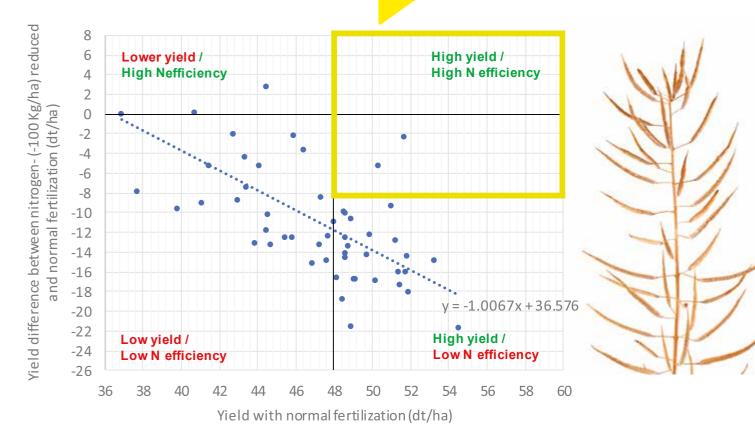






# Results of nitrogen trials 3 years 2 locations in France

"We select better nitrogen efficient hybrids with lower yield losses under reduced fertilisation."

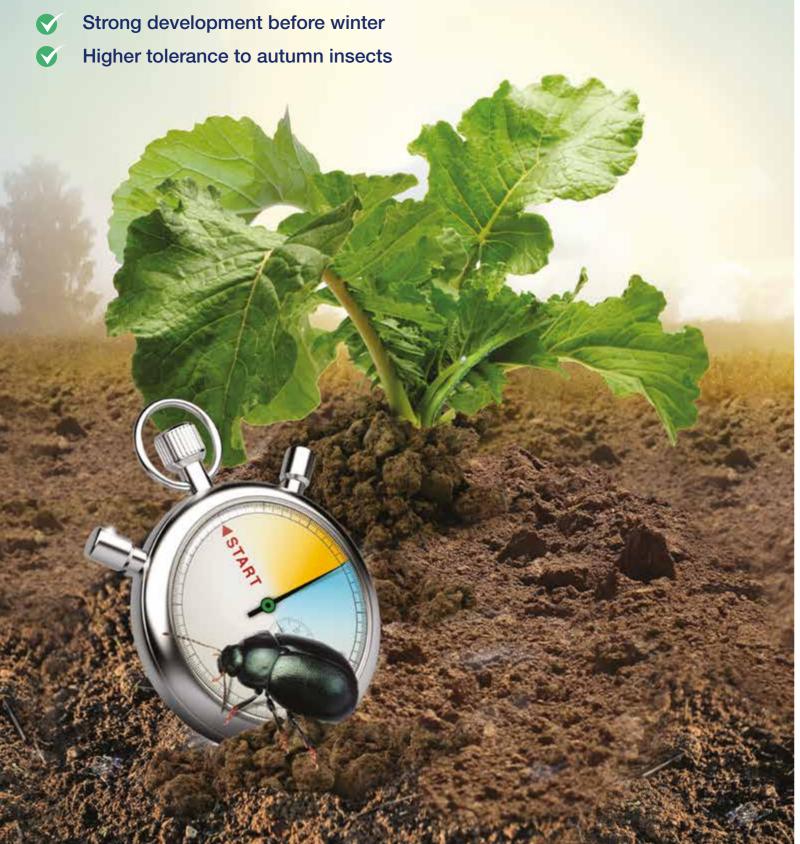


Source: R&D Trials 2019-2022, France

# SAFEGUARD THE YIELD OF YOUR RAPESEEDS

# **INSECT** FOCUS

Better early vigor until 4 leaves stage



SAFETY+

Global warming, drought, heat make sowing conditions increasingly difficult and uncertain for OSR. This has 2 main consequences:

- Later sowing in September results in difficult emergence
- Difficult growth at early stages which is leading to a more sensitive OSR to autumn insects, especially Flea Bettle.

As Europe is reducing and even stopping certain active insecticidal molecules, genetics becomes the 1st lever to mitigate the impacts on the yield. Indeed the SAFETY+ portfolio proposes varieties with combined characteristics that have most effect on this mitigation:

### +5% of plants at 4 leaves stage\*



Quick development to pass the insect sensitive stage as quickly as possible (before 4 leaves stage).



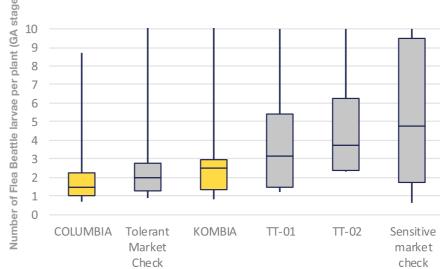
High biomass production before winter to avoid loss of plants even infected by Flea Beattle.

# **INFECTED PLANT**



### 2022 & 2023 Berlese test: Counting of larvae on OSR

(4 locations in France)





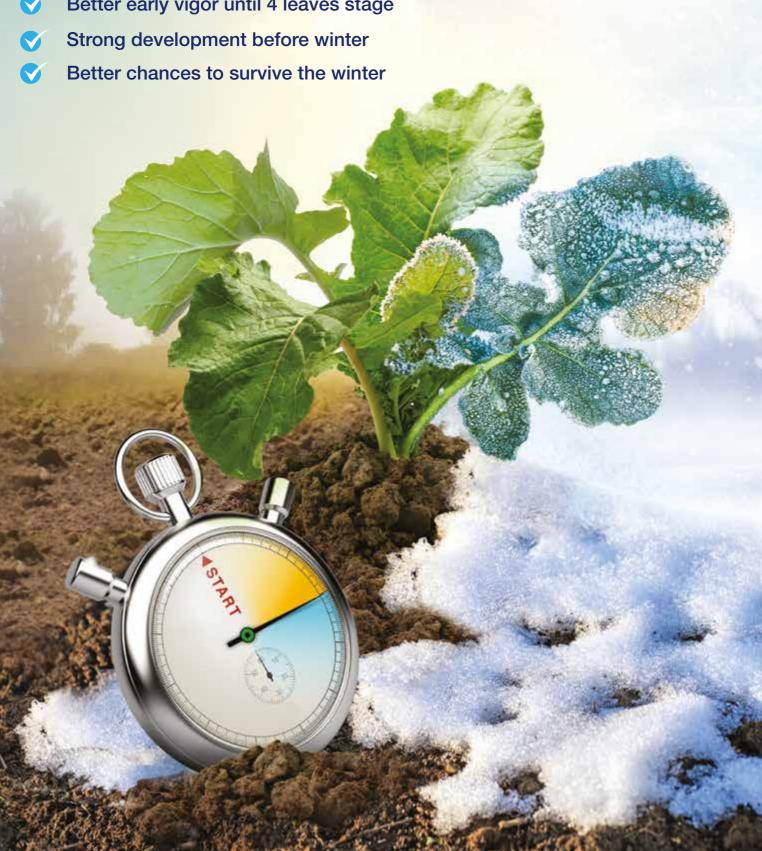


SAFETY+ hybrids have the best tolerance to autumn insect available on the market

# SAFEGUARD THE YIELD OF YOUR RAPESEEDS

# **COLD** FOCUS

Better early vigor until 4 leaves stage



SAFETY-

Global warming, drought, heat make sowing conditions increasingly difficult and uncertain for OSR. This has 2 main consequences:

- Later sowing in September which causes difficult emergence
- Difficult growth at early sensitive stages which exposes OSR to frost

In the context of late sowing, reaching the 8 leaves is critical to ensure maximal winter hardiness. The SAFETY+ portfolio proposes varieties with combined characteristics that gives the best odds to win this race against time:

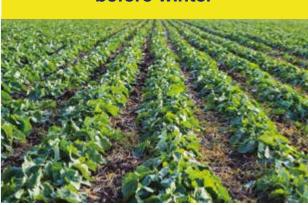
+5% of plants at 8 leaves stage\*



Good early vigor and quick development: key to reach 8 leaves stage as quickly as possible.



+0.2 to 0.5 kg/m<sup>2</sup> of biomass before winter\*



Rapeseed biomass: protects the growing point from frost and therefore limits plant loss during winter.



### SAFETY+ hybrids are the only one we recommend for late sowing



Under late sowing conditions, SAFETY+ hybrids have the best chance of reaching 8 leaves stage before winter and develop enough biomass to limit losses during the winter.



\*: Source R&D MAS Seeds 2018 at 2020

MID EARLY | WOSR







### A PROFITABLE HYBRID

YIELD REGULARITY to achieve your objectives whatever the conditions

- RESISTANT TO STEM ELONGATION adapted for early sowing
- EXCEL IN HIGH POTENTIAL to valorize yours inputs

### **MATURITY & TYPE**

Type: **OGU-INRA** Flowering: Mid early

### **OIL CHARACTERITICS**

Oil content: 42-44% 34-36% Protein content: GLS content: 15-17

### **DISEASES**

Phoma: 8 Sclerotinia stem: 7 Leaf lighting spot: 7 7 Dry stem:

### **AGRONOMY**

Early vigor: 8 Stem elongation:

Growth after winter: Mid-early

Pod shattering: Lodging:

1-3 sensitive | 4-6 medium - good | 7-9 tolerant | excellent



### **GROWING RECOMMENDATIONS**

	Optimal conditions	Limited conditions
Adaptation	++++	+++
Density at harvest (pl/m2)	30-40	35-40

KOMBIA demonstrates an outstanding yield regularity in our network all over Europe. It especially excel in high yield situations. With its good early vigor and very good stem elongation resistance, KOMBIA is particularly adapted for early sowing.

MID LATE | WOSR



# COLUMBIA #



### THE SAFETY+ HYBRID

SAFETY+ to mitigate impact of insects

EXCELLENT YIELD POTENTIAL above market references

A ROBUST HYBRID good early vigor and disease tolerance

### **MATURITY & TYPE**

Type: **OGU-INRA** Mid late Flowering:

### **OIL CHARACTERITICS**

42-44% Oil content: 34-36% Protein content: GLS content: 17-19

### **DISEASES**

Phoma: 8 Sclerotinia stem: 8 Leaf lighting spot: 6 Dry stem: 8

### **AGRONOMY**

Early vigor: 9 Stem elongation: Growth after winter: Mid-late Pod shattering: Lodging:

1-3 sensitive | 4-6 medium - good | 7-9 tolerant | excellent



### **GROWING RECOMMENDATIONS**

	Optimal conditions	Limited conditions
Adaptation	+++	++++
Density at harvest (pl/m2)	25-35	35-40

**COLUMBIA** is the ideotype of SAFETY+ hybrid: Among best early vigor in the market with strong biomass production before winter COLUMBIA has best characteristics to mitigate impact of insects in autumn.

### **SOYBEAN**

Increasing protein and feed autonomy is a way to reduce the negative impacts on the environment, manage economic and climatic risks thus improve the sustainability of the farms. Today most European livestock farmers depend on imported animal feed protein such as soybeans. About 75% of the global soybean output is used for animal feed and EU is the number two importer of soybean, mostly from US and Brazil. This high amount of import is coupled with high risk factors such as fluctuating prices, availability, gas emissions, GMO content.





In addition to their crucial role in protein autonomy for cattle farmers, soybeans are excellent nitrogen fixators which makes them them excellent choice of crop for agroecological farming systems.

In our efforts to contribute for agroecological shift in faming we have recently enlarged our soybean portfolio and introduced in several countries in Europe to support local protein sector.

Today MAS Seeds® offers varieties for various uses and maturities:

- ANIMAL FEED
- HUMAN CONSUMPTION
- MATURITIES 00 / 0 / I

			CHARACTERISTICS								
	VARIETY	Maturity group	Protein	Oil	Color of hilum	Color of flowers					
NEW	ALBENGA	00	42-43%	Medium	Yellow	Purple					
	SONJA	0,5	39-41%	Medium	Brown	Purple					
	CRIMILDE	1-	37-39%	High	White	Purple					
NEW	ARTESIA	1-	38-40%	Medium-High	Brown	Purple					

### **Basic cultivation best practices**

### Sowing

In Europe soybean sowing should be done in spring when the soil temperatures reaches 10°C followed by a consistent increase in soil temperature. Ideal sowing depth is 3-4 cm, whereas it should be adapted for eary sowing in colder soils at 2 cm.

### Distance between the rows:

- 18 30 cm for 000 maturity groups
- 18 50 cm for 00 maturitiy groups
- 25 60 cm for 0 and II

### Innoculation

Soybeans must be innoculated with Bradyrhizobium bacteries so that they can produce nodules for nitrogen fixation.



### **Weed Control**

The ideal way to control weeds is through crop rotation and tillage:

- Favour long and diversified rotations, with alternating winter crops and spring crops to hinder weed cycles.
- In the event of major difficulties linked to grasses (ryegrass, foxtails, crabgrass), plow every 3 to 4 years to reduce the seed stock and limit crop emergence rates.
- In rotation with maize, soy is an opportunity to manage annual and perennial grasses (quack grass, Aleppo sorghum) via foliar herbicides.

### **Harvest**

In European conditions the harvest occur during September – October. The indicators that the field is ready to harvest are:

- The plant lost its leaves, the stem is dry and vellow
- The grains can easily be removed from the pods. When you press the pods, the cracking sound can be heard
- The grains are hard and difficult to press with the finger nails.

	AGRONOMY										
Early vigor	Type of growth	Ramification capacity	Soil coverage	Height of 1st pod	Lodging	Shattering resistance	VARIETY				
7	Indeterminated	8	8	Medium	7	8	ALBENGA	NEW			
6	Half-indetermi- nated	7	7	Medium	8	8	SONJA	-			
8	Half- indeterminated	9	9	High	8	9	CRIMILDE	-			
8	Half-Indetermi- nated	9	9	Medium-High	7	8	ARTESIA	NEW			





### NEW

# ALBENGA

THE PROTEIN MAKER

- EXCELLENT YIELD in the 00 group
- HIGH PROTEIN CONTENT 42 - 44%
- ADAPTABLE USE
   end of 00 group with yield potential

### **CHARACTERISTICS**

Maturity: End of 00 group
Flower colour: Purple
Hilum colour: Yellow
TKW: Medium

Protein content: 42-44 %
Oil content: Medium

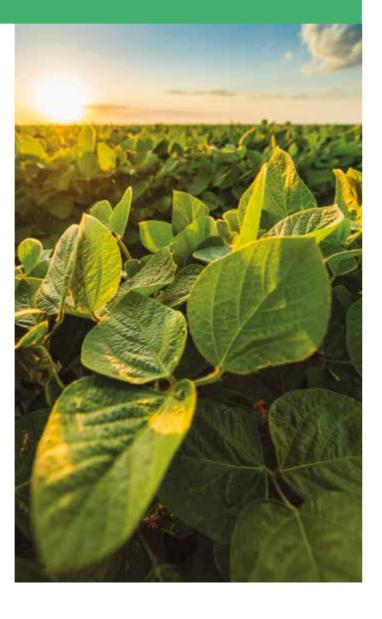
### **AGRONOMY**

Plant height: Medium-high
First pod height: Medium
Growth type: Indeterminate

Soil coverage: 8
Ramification capacity: 8
Starting vigor: 7
Tolerance to water stress: 7

Tolerance to Sclerotinia:

1-3 sensible I 4-6 average - good I 7-9 good to excellent



### RECOMMENDATIONS

Plant density: 55-60 plants /m<sup>2</sup> Sowing depth: 3-4 cm

Sowing period adaptation										
EARLY OPTIMAL LATE 2nd CROP										
++++	+++	++	+++							

### YIELD PERFORMANCE

French registration results: 105.9%\*

\*Official result from French Ministry of Agriculture in 2019



### Commercial bag of 125 00 kernels

### PRE-INOCULATION:

The shelf life of the inoculum is 80 to 90 days with a storage temperature of 18°C. Lower temperature storage has a positive impact on the lifespan of rhizobia on seeds. We recommend a temperature below 25°C for storage and transport of pre-inoculated seeds.



# **ARTESIA**

NEW

**TOP YIELD LEVEL** 

### EXCELLENT YIELD POTENTIAL suitable for intensive farming

# VERY GOOD RAMIFICATION CAPACITY

covers very well the soil to limit weeds development

**■ VERY GOOD STARTING VIGOR** 

to ensure a perfect start

### **CHARACTERISTICS**

Maturity: 1Flower colour: Purple
Hilum colour: Brow
TKW: Medium
Protein content: 38-40 %
Oil content: Medium-high

### **AGRONOMY**

Plant height: Medium-high

First pod height: Medium-high

Growth type: Half-indeterminate

Soil coverage: 9

Ramification capacity: 9

Starting vigor: 8

Tolerance to water stress: 7

Tolerance to Sclerotinia: 7

1-3 sensible I 4-6 average - good I 7-9 good to excellent

# RECOMMENDATIONS

Plant density: 50-55 plants /m²

Sowing depth: 3-4 cm

Sowing period adaptation										
EARLY	EARLY OPTIMAL LATE 2nd CROP									
++++	+++	+	-							

### YIELD PERFORMANCE

Austrian registration results 2021: 107.0%\* (average yield of location 4,00 t/ha)

\*Official result from Austrian Ministry of Agriculture in 2021



Commercial bag of 125 00 kernels

### PRE-INOCULATION:

The shelf life of the inoculum is 80 to 90 days with a storage temperature of 18°C. Lower temperature storage has a positive impact on the lifespan of rhizobia on seeds. We recommend a temperature below 25°C for storage and transport of pre-inoculated seeds.

56 57



### **ALFALFA: MAS ALFA PRODUCTS PORTFOLIO: ENSURE STABILITY AT HIGH PERFORMANCES**

MAS ALFA PRODUCT PORTFOLIO: The origin & MAS Seeds® alfalfa R&D network inauguration in 2018

The choice of alfalfa seeds is a very important decision for farmers as it is cultivated for long term hay production (from 3 to 5 years).

Over the past 5 years, alfalfa seed production has been regularly impacted by climate disruption (droughts, irregular and important rainfalls at harvest) regularly leading to seed shortages for certain varieties. In this context it is a challenge to ensure the exact varietal composition of the product for all customers.

Our priority is to deliver high performant products whatever their varietal compositions. To answer this challenge, MAS Seeds® has selected a pool of high performing varieties.

MAS Seeds® has therefore set up an alfalfa R&D network in several countries (Romania, Russia, Spain and Italy). The main objective is to evaluate and select the best alfalfa varieties.



		С	PERFORMANCES									
PRODUCT	Dormancy	Composition	Duration	Main Harvest Method	Main use	Dehy- dration	Yield potential	Spring produc- tivity	Summer productivity	Autumn produc- tivity	All year long productivity	
PURE VARIETY												
MAS ALFA 4	4	GALAXIE, NUTRIX, RIANNA	3-6 years	Cutting	Silage, Wrapping, Hay	yes	8	9	8	7	8	
MAS ALFA 6	6	OCCITANE, LZ0620*	3-6 years	Cutting	Silage, Wrapping, Hay	yes	8	8	8	8	8	
MAS ALFA 8	8	TEQUILA, SPEEDA	3-6 years	Cutting	Silage, Wrapping, Hay	yes	9	8	9	9	8	
ASSOCIAT	ION OF 2	2 VARIETIES										
MAS ALFA DUO 4	4	55% D4 Variety 45% D4 Variety	3-6 years	Cutting	Silage, Wrapping, Hay	yes	8	9	8	7	8	
MAS ALFA DUO 6	6-7	55% D6 Variety 45% D7 Variety	3-6 years	Cutting	Silage, Wrapping, Hay	yes	8	8	9	8	8	
MAS ALFA DUO 8	4-6	55% D8 Variety 45% D7 Variety	3-6 years	Cutting	Silage, Wrapping, Hay	yes	9	8	9	9	8	
ASSOCIAT	ION OF 4	4 VARIETIES										
MAS ALFA QUATTRO	4-5	25% D3 Variety 25% D4 Variety 25% D4 Variety 25% D6 Variety	3-6 years	Cutting	Silage, Wrapping, Hay	no	8	9	9	9	9	





The research consists of a meticulous evaluation and selection of alfalfa varieties based on the individual performances (yield, protein content) and agronomic characteristics such as vigor after sowing, winter hardiness, start of growth after winter. The ability of varieties to combine in the field in associations to maximize and stabilize production is carefully tested.

Dormancy 6-8

MAS Seeds® has therefore set up an alfalfa R&D network in several countries (Romania, Russia, Spain and Italy). The main objective is to evaluate and select the best alfalfa varieties.

### Variety portfolio 23-24

DORMANCY	NAME
2-3	LUZELLE, LIMORY
4-5	GALAXIE, NUTRIX, RIANNA
6-7	OCCITANE, LZ0620*
7-8	TEQUILLA, SPEEDA

FOD QUA	DER LITY		AGRO	NOMY	DMY DIS		ES & PE	ESTS	RECOMMEN	NDATIONS	
Protein content	Digesti- bility	Vigor after sowing	Lodging	Winter- hardiness	Leaf spot	Verticili- um wilt	Anthrac- nose	Nema- todes	Sowing rate kg/ha	Irrigation	PRODUCT
										PU	RE VARIETY
8	9	8	9	Very winter hardy	8	7	8	9	20-25 kg/ha	-	MAS ALFA 4
9	9	9	8	Winter hardy	9	7	8	9	20-25 kg/ha	-	MAS ALFA 6
7	8	7	9	Moderately winter hardy	8	8	7	8	20-25 kg/ha	Recom- mended	MAS ALFA 8
									ASSOCIA	TION OF 2	2 VARIETIES
9	8	8	9	Very winter hardy	8	8	8	9	20-25 kg/ha	-	MAS ALFA DUO 4
9	9	9	8	Winter hardy	9	8	8	9	20-25 kg/ha	-	MAS ALFA DUO 6
8	9	7	9	Moderately winter hardy	8	9	7	8	20-25 kg/ha	Recom- mended	MAS ALFA DUO 8
									ASSOCIA	TION OF	4 VARIETIES
9	9	8	9	Very winter hardy	9	9	9	9	20-25 kg/ha	-	MAS ALFA QUATTRO



# **AGROSTART®+ MYCO:** MORE THAN A TREATMENT, IT IS AN INNOVATIVE SEED APPLIED SOLUTION!

### 2 innovative formulations to boost your alfalfa seeds

The innovative AGROSTART® standard formulation includes inoculation and micro-nutrition to improve field establishment, yield and the quality.

The advanced formulation **AGROSTART®+ MYCO** has mycorrhization in addition to boost the alfalfa crop all along the vegetation.

ACTION	COMPONENT	BENEFITS	AGRO START	AGROUSTART - MYCO
INOCULATION	Rhizobium Meliloti	<ul><li>Ensure development of nodosity</li><li>Higher yield</li><li>Higher protein fodder</li></ul>	<b>V</b>	V
MICRO- NUTRITION	Major and trace elements	<ul><li>Improve alfalfa establishment</li><li>Higher yield for 1st cut</li></ul>	<b>✓</b>	<b>V</b>
MYCORHIZATION	Glomus intraradices	<ul><li>Higher yield</li><li>Better regularity over time &amp; space</li><li>Higher stress resistance and better sustainability</li></ul>		•
			+6,3% protein yield +4% crop yield*	+11,5% protein yield +6,5% crop yield*

<sup>\*</sup> MAS Seeds & CERIENCE R&D data, trials conducted on 4 locations (France, Spain, Poland, Romania) comparison to untreated seeds

### Opt for an advanced formula with MYCORHIZATION



**AGROSTART®+ MYCO** with **MYCORHIZATION** enhances the nutrients absorption ability of alfalfa and brings therefore following benefits:

- Better stress resistance (salt, drought, cold)
- Higher and more stable yield over 4 years of cultivation
- Better fodder quality, higher protein content
- Better vigour and growth

# THE SEED APPLIED INNOVATION FOR ALFALFA

# What is AGROSTART®+ MYCO?

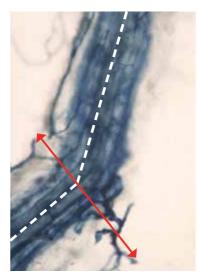
AGROSTART®+ MYCO is a new seed applied solution with a triple mode of action:

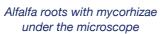
- 1. Inoculation
- 2. Micronutrients
- 3. Mycorrhization

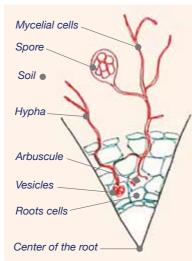
AGROSTART+ MYCO completes AGROSTART seed application with Glomus intraradices fungi that creates the mycorrhiza- plant symbiosis.

The symbiosis take place in the soil between the fungi and the alfalfa roots. It is stimulated by the presence of rhizobium and take around 1 year to set up and provides its positive effects.









Scheme of cross section of alfalfa roots with mycorhizae

# What are the benefits of mycorrizhal symbiosis for alfalfa?

The symbiosis between *Glomus intraradices* and alfalfa benefits for both of the species:

- Alfalfa provides food and shelter for the fungus: carbon compounds (=simple sugars), some amino-acid and shelter for the fungi which ensure its survival and growth.
- In return the fungus shares its roots which greatly enhances
  the alfalfa's ability to absorb nutrients, especially phosphorus
  (N, P, K, Ca, Mg, S, Cu, Zn, Mn, Fe) and also water. Alfalfa
  requires high quantities of phosphore and the mycorhyze
  increase phosphore intake about +300% (Jansa et al. 2008
  New Phytologist).



### What are the benefits for farmers?

The enhanced absorption ability of alfalfa with AGROSTART+ MYCO produces following benefits:

- · Better stress resistance (salt, drought, cold)
- · Higher and more stable yield over 4 years of cultivation
- Better fodder quality, higher protein content
- Better vigour and growth
- · Higher stability of soil structure



Different seed applications testedon MAS ALFA DUO4	Average dry matter yield	Average % TNC*/kg/DM	Protein yield/ha	Protein added value/ha Soybean cake 350 €/t
Untreated (control)	<b>100</b> % 12,4 t/ha	23,1%	<b>100</b> % 2 864 kg	0 €
** READY	<b>100</b> % 12,4 t/ha	23,6%	<b>102,2</b> % 2 926 kg	+144 €
AGROV START	<b>104</b> % 12,9 t/ha	23,6%	<b>106,3</b> % 3 044 kg	+420 €
AGRO START + MYCO	<b>106,5</b> % 13,2 t/ha	24,2%	<b>111,5</b> % 3 194 kg	+771 €

\* TNC= Total Nitrogen Content MAS Seeds & CERIENCE R&D data, trials conducted on 4 locations (France, Spain, Poland, Romania)





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SILAGE | HAY | WRAPPING

# MAS ALFA DUO 4

### THE REFERENCE TO SECURE YIELD IN EVERY CONDITIONS

OUTSTANDING YIELD

through a symbiosis between 2 varieties

RELIABILITY FOR YIELD **AND QUALITY** 

with a high disease tolerance

**EXCELLENT IN PROTEIN AND DIGESTIBILITY** 

resulting a high value forage harvest

### **COMPOSITION & USE**

2 varieties (dormancy 4-5): mix of 55% and 45%

Duration: 3-6 years Main harvest method: cutting

Main use: silage, wrapping, hay

Dehydration: yes

### **PERFORMANCES**

Yield potential: All year long productivity:



### **FODDER QUALITY**

Protein content: Digestibility:

### **AGRONOMY**

Vigor after sowing: 8 Lodging:

Winter-hardiness: very winter hardy

1-3 sensible I 4-6 average - good I 7-9 good to excellent



### **DISEASES & PESTS**

Leaf spot: Verticiium wilt: Anthracnose: Nematodes:

### **SOWING DENSITY**

PACKAGING 25 kg

Sowing rate: 20-25 kg/ha



SILAGE | HAY | WRAPPING

# MAS ALFA DUO 6

### SECURE HIGH YIELD AND QUALITY IN EVERY CONDITIONS

### **A HIGH YIELD POTENTIAL**

in every condition thanks to the combination of two varieties

### AN OUTSTANDING QUALITY

due to a very good protein content and digestibility

HIGHLY RESISTANT TO NEMATODE and anthracnose



2 varieties (dormancy 6-7): mix of 55% and 45%

Duration: 3-6 years Main harvest method: cutting

Main use: silage, wrapping, hay

Dehydration: yes

### **PERFORMANCES**

Yield potential: All year long productivity:



### **FODDER QUALITY**

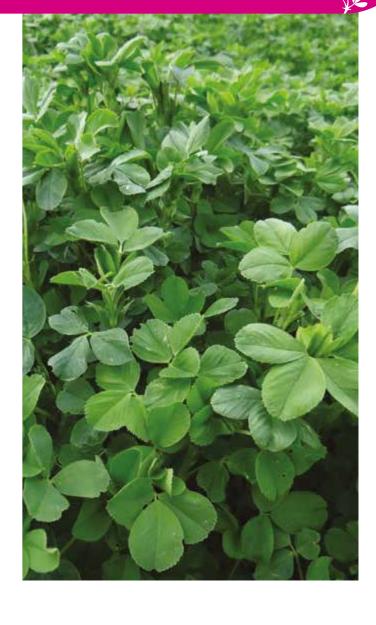
Protein content: Digestibility:

### **AGRONOMY**

Vigor after sowing: 9 Lodging: 8

Winter-hardiness: winter hardy

1-3 sensible I 4-6 average - good I 7-9 good to excellent



### **DISEASES & PESTS**

Leaf spot: Verticiium wilt: 8 Anthracnose: 8 Nematodes:

### **SOWING DENSITY**

Sowing rate: 20-25 kg/ha



PACKAGING 25 kg



Through our ambition "Act together for a changing agriculture", MAS Seeds® aligned with the European Commission directives to reduce by at least 55% by 2023 greenhouse gases. This sustainability ambition is not only translated by an evolution of our product offer but also by an Agro-Services offer.

Our Agro-Services offer aims at supporting farmers in the process to adapt their crop practices and make them more sustainable. Furthermore through Agro-Services we strengthen our relationship with our customers on the field to help them take the best decisions all along the campaign, optimize their crop practices and improve their profitability.

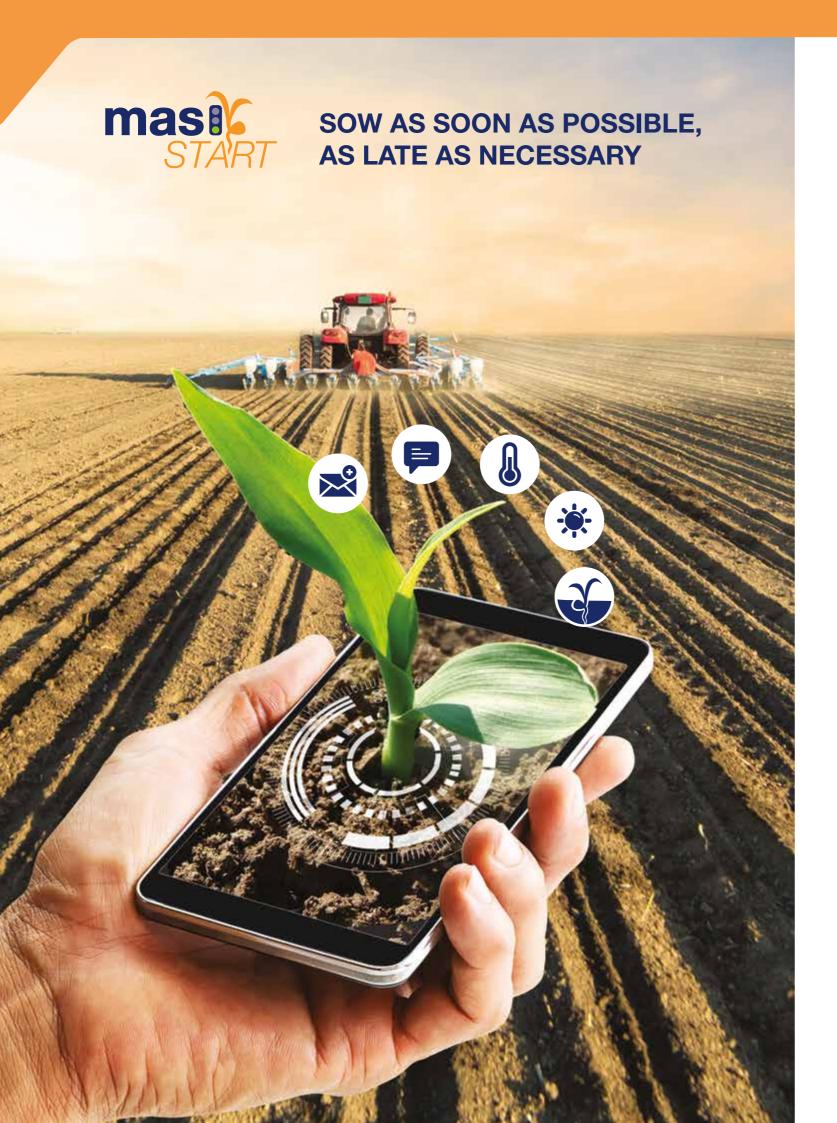
New technologies in agriculture allow to propose models and services increasingly precise, accessible and simple to use for farmers. Agro-Services we propose are based on the new technologies and adapted to different types and needs of customers, whether they are farmers or distributors, whether they grow maize or sunflower, or other crops from sowing to harvest.



### **AGROPLUS®** and **NUTRIPLUS®**:

- AGROPLUS® Services are dedicated to all field crop producers to increase their yields in a sustainable way. The agro-services support decision for most of MAS Seeds® crops; grain or silage maize, sunflower, rapeseed and alfalfa.
- NUTRIPLUS® Services help dairy farmers to get forage autonomy and increase their nutrition efficiency. The services provides additional diagnostics and decision support for silage maize growers.





A correct sowing contributes to 60% of the crop yield. MAS Seeds®, through the service MAS START, helps farmers in taking sowing time decision with a peace of mind. The service relies on agronomic knowledge as well as agro-weather expertise, and your seeds against weather related emergence losses.

User:

### Maximize your yield by improving your sowing

An early sowing, if the conditions are favourable, contributes to yield optimisation thanks to:

- longer crop cycle
- fast and homogeneous emergence
- lower water stress during flowering.

In average, an early sowing increases grain maize yield by 6 t/ha.



Crops:

### A personalised service at field level

Thanks to our **agronomic knowledge** of seeds and our **agro-weather expertise**, we supervise fields during the sowing period to advise the best personalised sowing window. This forecast is made possible thanks to the following of different key agro-weather parameters specific for sowing: soil temperature, dynamic of emergence, frost risk, cumulative rainfall etc. When sowing conditions become favourable, the farmer receives an SMS and an email with sowing alerts:





### **PRE-START ALERT**

Alert within the 10 days prior to the 1st favourable sowing window: «Sowing conditions will be soon favourable»





### **START ALERT**

Alert at the beginning of the favourable sowing window: «Start sowing today»

### A service which secures seed emergence



### **EMERGENCE INSURANCE\***

If sowing is realised in the 7 days after the start alert and emergence losses\*\* are observed



**FREE SEEDS for resowing** 

\*Available only in selected countries for maize and sunflower seeds.

\*\*Emergence losses: maize > 20%; sunflower > 30%



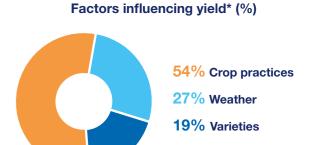
AGROPLUS® Report consists of a complete analysis of your field with cultural advices in order to optimise your crop operations and reach the yield potential of MAS Seeds® varieties. The reports are created by your MAS Seeds® technician and sent to you by email 3 times in the vegetation.



### Optimise yields by improving crop operations

Crop yield can be explained at **54**% by crop operations: sowing time or density, soil preparation, fertilisation, harvest, etc.

To optimise crop practices, it is necessary to understand and analyse the specific conditions of the field (soil, weather, constraints...) and make the most adapted crop practice choice.



\* Source: University of Illinois Crop Physiology science

### Personalised agronomic reports

3 agronomic reports are sent by email in pdf at 3 key periods of the crop cycle:

- 1. post-emergence
- 2. post-flowering
- 3. post-harvest

These 3 reports combine field observations following your MAS Seeds® technician visit and agro-weather analyses taking into account the field conditions:





### **OBSERVATIONS**

Notes and pictures of the field taken during visits of your MAS Seeds technician.



### **CROP OPERATIONS**

Summary of the field crop operations: sowing date, density, treatment, etc.



### **AGRO-WEATHER INDICATORS**

Specific indicators of the analysed period are integrated into the reports to understand the observations made. For example: sowing conditions, weather indicators for a specific physiological period, etc.



### **PERSONALISED ADVICES**

Your MAS Seeds technician adds personalised advices to your report based on the previous elements analysed before.



AGROTEMPO® Technician gives to the team of technicians access to all modules of AGROTEMPO: a digital tool to follow, anticipate and optimise crop operations from sowing to harvest for maize, sunflower, oilseed rape and alfalfa.



### Input field data from sowing to harvest

**AGROTEMPO**® is the tool used by technicians and agronomists during customer visits on the field to rapidly and simply input field data, visualize and analyze all data collected.

It give a **complete and detailed field overview and farmer situation** to help the technician to give personalized advices.





### INPUT

- Crop operations from sowing to harvest
- Fields observations with notes and pictures
- Adapted for both commercial fields and trials

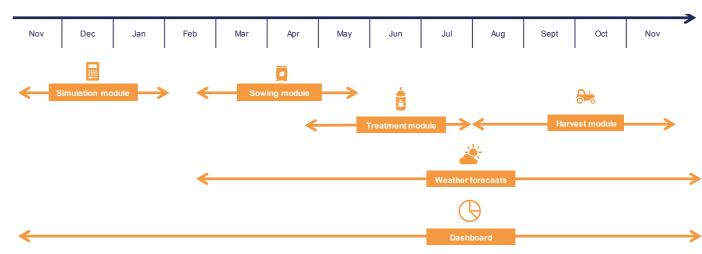


### **VISUALIZE AND ANALYSE**

- Data visualisation interface
- Summary of indicators to follow the campaign advancement
- Data export

### **Qualitative agro-weather modules**

Some agro-weather modules are also available all along the campaign to help technicians to take decision during different crop periods. Combined with the collected field data it helps anticipating and optimising crop operations. The modules combines MAS Seeds agronomic knowledge of seeds and agro-weather expertise.





# HIGH QUALITY SILAGE BY SATELLITE PRECISION



NUTRIPLUS® Sat service is the association of satellite image technology and MAS Seeds® agronomic knowledges to follow and anticipate the percentage of dry matter evolution in silage maize to optimize harvest and silo quality.



# Define your harvest date to optimise silage quality

Two out of three farmers do not harvest at the right stage: 50 to 250€/ha losses because of harvest at the wrong stage.

Silage harvest can not be improvised, it needs to be precise.

# Benefit from advanced satellite technology

The satellite technology answers to theses issues with the following characteristics:

- Real-time imagery
- High Frequency, new updated image is available every 10-15 days
- High-resolution imagery





### Receive precise silage harvest advice and personalized report

NUTRIPLUS® SAT Service provide **regular customer reports from 23% DM until harvest** following these characteristics:



### **Observe**

%DM field map of the current date



### Anticipate

%DM forecast field maps



### Act

Best harvest period recommendation



### **Optimize**

In-field and field harvest advices



NUTRIPLUS® Harvest service helps to optimise harvest quality by forecasting the best harvest window based on the plant analysis from on your field.

User:	
Service:	
Crops:	

### Define your harvest date to optimise silage quality

Harvest at the right date the silage maize is a key objective for dairy farmers. It's the guarantee to harvest the best feed value and to have a good conservation on the silo because 2 out of 3 farmers do not harvest at the right stage in silage.

A bad silage quality management can lead to 50 to 250 €/ha losses or 4000/silo\*.

Silage Quality

### Benefit from infrared technology

The XNIR or AGRINIR sensor measures the dry matter (DM) percentage of silage maize directly on the field:

- Measure: Direct plant measure
- Precision: Infra-red technology
- MAS Seeds® expertise: Specific MAS Seeds® calibration on green maize plant



### Receive in field diagnostics & advices

Our MAS Seeds® expert makes a diagnostic of your plants thanks to a high precision sensor:



### **OBSERVE**

Measure %DM content of your silage maize using infrared sensor directly on the field



### **ANTICIPATE**

Forecast of the field %DM evolution

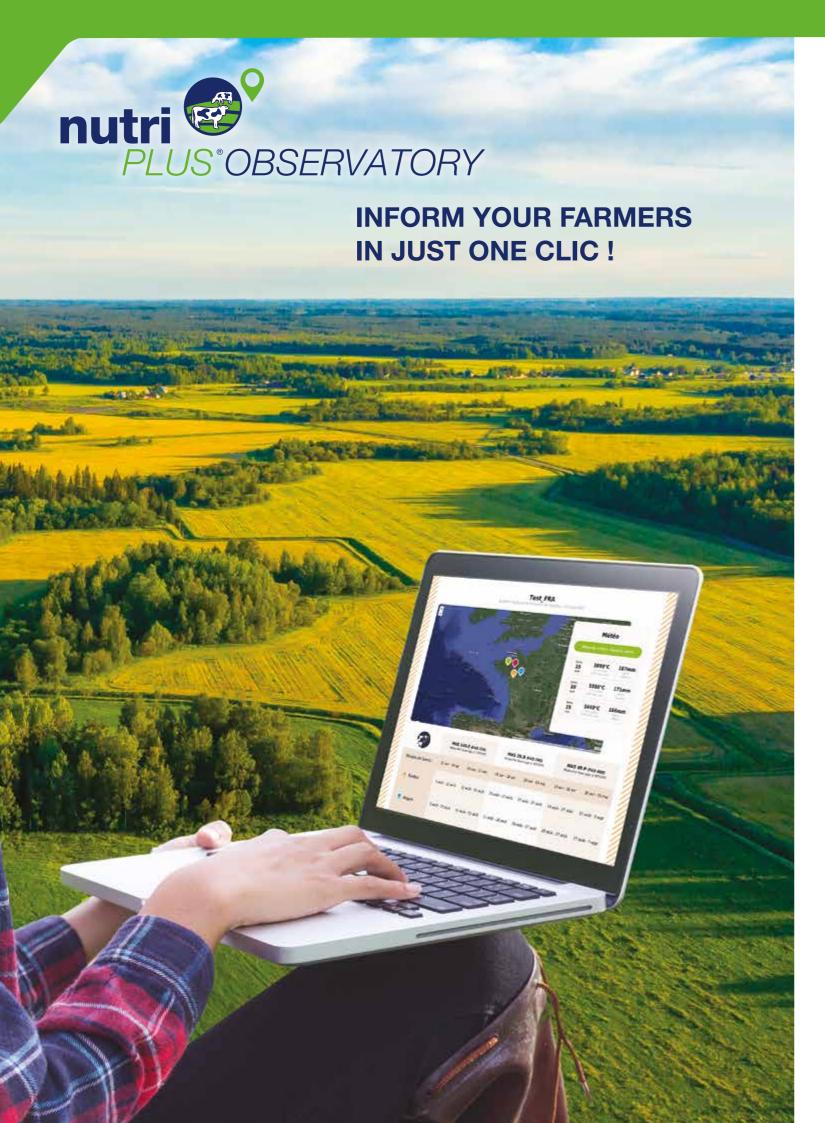


### **ADVISE**

Recommend the best harvest period

Plant Quality + Harvest Quality + Fermentation Quality

<sup>\*1</sup> ton of dry matter costs about 100 € to produce (average in France)



With NUTRIPLUS® Observatory, agronomists can easily and rapidly inform and communicate to their farmers or technicians about the silage forecast harvest dates in their region.



### Inform your farmers close to harvest

Harvest date in silage in one of the key parameter to get a qualitative and quantitative silage. We observe that 2 out of 3 farmers do not harvest at the right stage in silage.

A bad silage quality management can lead to **50** to **250€/ha losses** or **4000€/silo\***. So, a key issue for a dealer is to be able to evaluate his farmers situation on his territory and inform them about harvest.



### **BETTER UNDERSTAND**

View variety of indicators for silage maize growers in your region (location, weather, sowing date, maturity group) and anticipate harvest date.

1 ton of dry matter cost about 100 € to produce (average in France)

### **BETTER COMMUNICATE**

Comunicate easily and rapidly to your technicians and farmers on harvest forecasts dates.

### The regional report

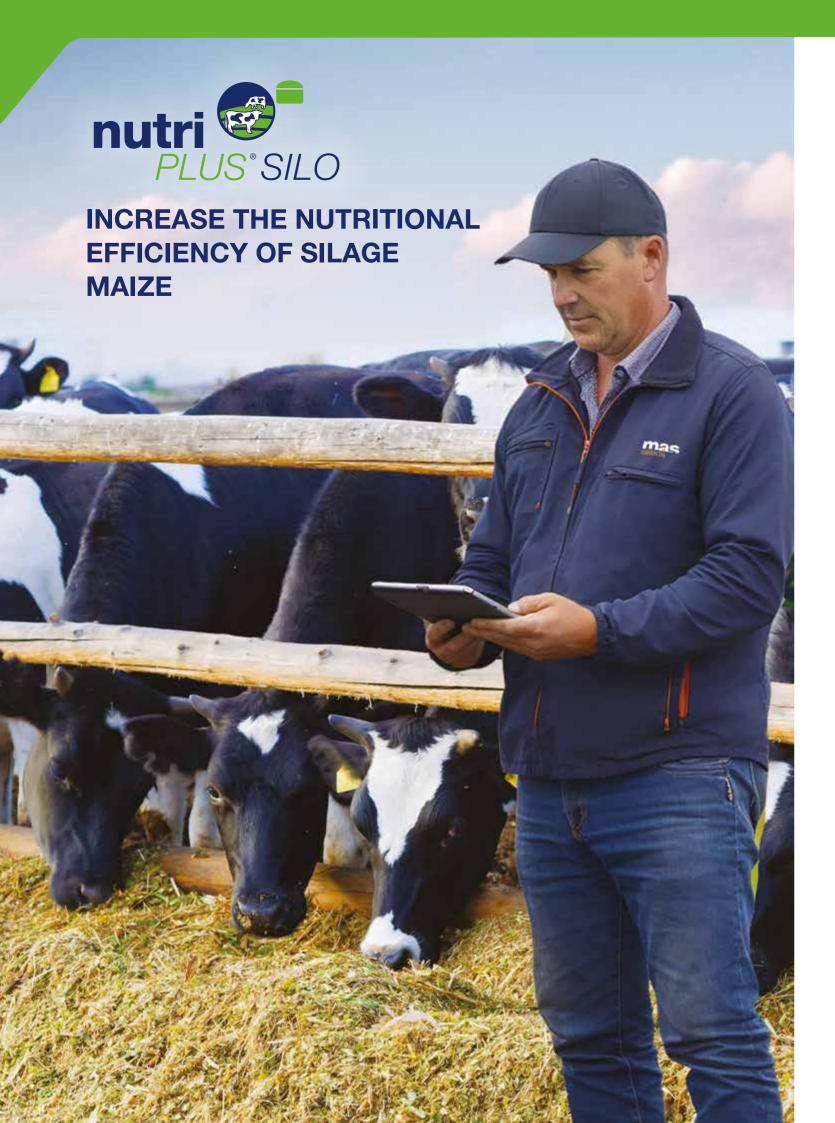
The NUTRIPLUS® Observatory delivers a harvest window forecast per maturity group depending on selected sowing window in a region. The report combines following information representing a region on a table:

Locations
Varieties from different maturities

Sowing periods

It is possible to identify all actual harvest maturity situation in a region at glance thanks to the summary of comparative data.

	MAS 10A Silage maturity at 35%DM		MAS Silage matur	<b>26R</b> ity at 35% DM	FREEMAN Silage maturity at 35%DM		
Sowing period :	15 apr - 30 aug	30 apr - 15 may	15 apr - 30 apr	30 apr - 15 may	15 apr - 30 apr	30 apr - 15 may	
Nantes (FR)	5 - 12 august	12 - 21 august	10 - 17 august	17 - 27 august	19 - 27 august	27 aug - 5 sept	
Angers (FR)	6 - 12 august	12 - 22 august	11 - 18 august	18 - 27 august	20- 27 august	27 aug - 7 sept	
Rennes (FR)	14 - 22 august	22 - 30 august	20 - 28 august	28 aug - 6 sept	30 aug - 7 sept	7 - 19 sept	
Loudéac (FR)	20 - 28 august	28 aug - 6 sept	27 aug- 3 sept	3 - 14 sept	7 - 16 sept	16 - 29 sept	



NUTRIPLUS® Silo is a real decision making tool helping to improve silo management practices by analysing your silo, identifying losses and giving you recommendations about how to improve for the next silo.



### Optimise my silo quality

Harvest date in silage in one of the key parameter to get a qualitative and quantitative.

2 out of 3 farmers do not harvest at the right stage in silage and A bad silage quality management can lead to 50 to 250€/ha losses or 4000/silo\*.



<sup>\*1</sup> ton of dry matter costs about 100 € to produce (average in France)

### Benefit from on farm silo diagnostics

Our MAS Seeds® expert, after opening your silo, makes a **complete diagnostic of your silo** thanks to a **hight precision sensor** (XNIR) collecting data:

Silo quality observation

Temperature & compaction sampling

Feed value analysis

Calculation of front attack advancement

The XNIR is a sensor to measure maize %DM with the following characteristics :

- Precision with the infra-red technology
- MAS Seeds® expertise with a specific calibration on silo

### Receive expert personalized report and advices about your silo

Our MAS Seeds® expert lets you after the diagnostic a complete report and personalised advices for a better silo management:



### **REPORT**

- Conservation quality
- Feed value
- Silo losses



### **ADVICES FOR NEXT CAMPAIGN**

- Variety advices
- Harvest
- Silo management

Advices given in the individualized report will contribute to improve the quality of your forage and adapting your diet.

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