PIONEER®

MADE TO GROW™

# THE **PIONEER** PROMISE

Pioneer is committed to improving peoples' lives and livelihoods. Our primary focus on the customer has earned us the reputation of being trustworthy, earnest and likeable. Our dedication and commitment to finding agricultural solutions to help improve crop yields and increase the productivity of producers around the globe remains the cornerstone of our business.

# OUR **PURPOSE**

To enrich the lives of those who produce and those who consume, ensuring progress for generations to come.

**OUR VALUES**

**Enrich Lives**
We commit to enhancing lives and the land

**Be Curious**
We innovate relentlessly

**Be Upstanding**
We always do what's right

**Stand Tall**
We are leaders and act boldly

**Build Together**
We grow by working together

**Live Safely**
We embrace safety and the environment in all we do

# THE **LONG** LOOK

**THE PIONEER WAY OF DOING BUSINESS**

We are an international company with a unique combination of cultures, languages and experiences. Our technologies and business environment have changed dramatically since Henry A. Wallace first founded the Hi-Bred Corn Company in 1926.

This Long Look business philosophy – our attitude toward research, production and marketing, and the worldwide network of Pioneer employees – will always remain true to the four simple statements which have guided us since our early years:

- We strive to produce the best products in the market.
- We deal honestly and fairly with our employees, sales representatives, business associates, customers and stockholders.
- We aggressively market our product without misrepresentation.
- We provide helpful management information to assist customers in making optimum profits from our products.

WE ARE SMART
**AGRICULTURE**

# WE ARE SMART
# AGRONOMY

## Unmatched agronomic expertise on the farm as a business

The Pioneer Agronomy team supports the efforts provided to Pioneer customers – to establish the best possible management practices for maximimum productivity on their farms.

The members of the Agronomy team bring together a wide range of agronomic expertise, specialties and experience to support and advise the clients. At Pioneer, we are committed to improving crop management.

## Our smart mission is to place the right product on the right hectare

**SPECIALISED** high-tech focus: The aim is to work scientifically to produce the best crop on the most consistent basis possible in any situation.

We have a **SPECIALISED**, diverse team, and each Agronomist specializes in a specific crop or in a specific aspect of crop production, as well as in a specific area. Pioneer has Product Agronomists who focus specifically on the IMPACT™ trials - from which they are constantly testing and releasing new products. The team's innovative research and data analysis methods are based on research on farm size, which enables us to manage a variety of variable factors that have an impact on grain production. The Pioneer Agronomy team broadens their research horizons and provides innovative information to provide the farmer with enriched data to make informed decisions throughout the year.

**MEASURABLE & ACHIEVABLE** results: Planter precision maps can also be written for the Pioneer genetics to deliver the highest potential yield on the specific soil potential. In this way, the Pioneer customer can optimize his returns, better efficiency, and reduce risks, through reliable agronomic characteristics, such as improved root mass and quicker, swift emergence.

**RELEVANT & RELIABLE** precision technology: The right product for the right hectare can be recommended using this digital technology. The Pioneer Agronomy team make better cultivar recommendations through new biotech traits, genetic placement and the right population on various soil potentials, for the specific genetics for **you** in **your** area.

Pioneer, the market leader, is a **TRIED & TRUSTED** brand. With Pioneer genetics and the latest research and unique digital applications, enhanced grain production and added value for the farmer in their specific area, are attainable.

In doing so, we strive to ensure food security for the future through **S M A R T** Pioneer genetics.

# S M A R T

**SPECIALISED**

High-tech focus team

**MEASURABLE**

Yield advantage
Competitive yield performance

**ACHIEVEABLE**

Root mass
Quicker and swift emergence

**RELEVANT & RELIABLE**

Biotech traits

Hybrid traits specialized to meet farmer needs in their area, environment and region

**TRUSTED**

Tried & trusted brand

WE ARE SMART

# SEED TREATMENT

LumiGEN® Seed Treatments

**A mark of assurance in seed treatments**

You choose a seed treatment package to help assure a successful season. In turn, you should feel assured that those seed treatments perform as expected, and work well with the genetics you're planting.

**LumiGEN® seed treatments are designed, verified and proven to work with Pioneer® genetics,** giving producers a higher level of confidence in their seed treatment options.

**Designed for our genetics**

We evaluate hundreds of product concept combinations to develop the right seed treatment formulations for our genetic lineup. Each year, we validate those combinations in labs, greenhouses and farmer fields. Our seed treatment development process relies on 30,000 research plot evaluations annually.

**Verified on our genetics**

LumiGEN® seed treatments capitalize on over 100 years of crop protection know-how, and an understanding of what growers need and how they farm. Our seed treatment combinations are carefully evaluated at the Corteva Agriscience Center of Seed Applied Technologies (CSAT)—an all-in-one facility that's part laboratory, testing center and seed treating plant. Here, seed treatments are reviewed using our exclusive six-step PASSER process.

**Proven in the field with our genetics**

Through our Field Test Network, our treated seed is evaluated by growers. It goes into the ground using real planters, under real conditions. On-farm testing is combined with our large-scale IMPACT™ testing program, where we conduct more than 60,000 plot evaluations each year. This testing helps ensure LumiGEN® seed treatments work no matter what Pioneer® brand hybrids or varieties you plant.

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# SEED PROTECTION

POWERCORE™

**PowerCore™ Trait Technology**

PowerCore™ technology is a high-performing, herbicide-resistant seed trait that effectively helps protect crops from damaging above-ground insects, such as the maize stalk borer and spotted maize stem borer.

**PowerCore™ technology offers extensive control of above-ground lepidopteran pests**

PowerCore™ technology uses combined modes of action to combat primary and secondary pests that can cause significant crop damage and subsequent production losses. The trait comprises of three different *Bacillus thuringiensis* (Bt) proteins, each targeting insects differently, while helping to prolong the durability of the technology. The multiple modes of action also ensure broad spectrum protection against above-ground pests.

## Insect Spectrum

Maize in Africa is attacked by many lepidopteran pests. These pests cause severe damage to maize and crop loss varies depending on the time and level of stem borer infestation.

**Maize Stalk Borer *(Busseola fusca)***

Is the most injurious stem borer of maize in South Africa and occurs at altitudes ranging from sea level to 2 000 m above sea level. It is widespread throughout the maize production triangle of South Africa.

**Spotted stem borer *(Chilo partellus)***

Is a stem boring insect which is a serious pest of maize, millet and sorghum. The spotted stem borer caterpillars damage these crops by boring or tunnelling inside their plant stems.

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PowerCore™ multi-event technology developed by Corteva Agriscience and Monsanto. PowerCore™ is a trademark of Monsanto Technology LLC. Roundup Ready® Maize 2 is a registered trademark of Monsanto LLC.

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# STEWARDSHIP BIOTECHNOLOGY GUIDE 2024

## PIONEER® BRAND PRODUCTS

## STEWARDSHIP OVERVIEW

### A MESSAGE ABOUT STEWARDSHIP

Pioneer is committed to the responsible management of all its seed products and when Pioneer introduces a new product in the market, we are in it for the long haul. Our philosophy of product stewardship means responsible management of the life cycle of our technologies, every step of the way – from initial research to the discontinuation of a product – for maximum product value, benefits and longevity (See *Figure 1*). Therefore, for the benefit of all value chain stakeholders (i.e. technology developer, producers and consumers) Pioneer requires all growers to comply with in-country biosafety regulations, Pioneer policies and crop management strategies specific to the product. In the Pioneer Technology Use Agreement (TUA) and Terms and Conditions of Purchase, growers who purchase and plant Pioneer® brand seed with biotech traits agree to adhere to the stewardship requirements described in this guide.


*Figure 1: Biotech Product Stewardship from research until product is discontinued.*

Stewardship includes, without limitation, the following:

- Adhering to directions of use on all seeds, and labels for pesticides
- Insect-resistant traited seeds must be planted with an accompanying refuge of non-biotech or herbicide-tolerant maize seed for Insect Resistance Management (IRM). The refuge must either comprise of at least 5% of the total maize crop planted (in which case the refuge may not be treated with an insecticide for the target insects), or at least 20% of the total maize crop planted if it is to be treated with an insecticide for the target insects.
(See *Table 2* & *Figure 2* for more details)
- Following IRM requirements to delay the development of resistance to biotech traits by the target pest populations
- Confirming trait acceptance, intended uses, and destinations with grain handlers (prior to delivery or using those products on-farm) for crops or material containing biotech traits (as indicated on *Table 1*)
- No exportation of seeds or any other material containing biotech traits into countries where the product is not allowed or registered, including through a third party
- Implementing any additional stewardship requirements that Pioneer deems necessary for a particular product (e.g. grain or feed use restrictions and geographical planting restrictions)

### WHY IS STEWARDSHIP IMPORTANT?

Proper stewardship of products is important because it offers the following benefits to growers:

- Access to Pioneer germplasm and biotech trait technologies in its seed products, subject to signing of the Technical Use Agreement.
- Protecting the long-term efficacy of Bt technologies
- Enables technology developers to invest in the development of better, high yield potential germplasm and additional technologies and innovations, further improving agricultural productivity for farmer's benefit

### OUR COMMITMENT TO EXCELLENCE THROUGH STEWARDSHIP®

Pioneer is a member of Excellence Through Stewardship® (ETS) and Pioneer® brand products are commercialised in accordance with ETS Product Launch Stewardship Guidance and in compliance with the Pioneer policies regarding stewardship of those products. Crops and materials containing biotech traits may only be exported to or used, processed, or sold in jurisdictions where all necessary regulatory approvals have been granted for those particular crops and materials. It is a violation of national and international laws to move materials containing biotech traits across borders into jurisdictions where their import is not permitted by regulatory authorities. Growers should discuss these issues with their purchaser or grain handler to confirm the purchaser or handler's position on products being purchased. Excellence Through Stewardship® is a registered trademark of the Excellence Through Stewardship.
For more information https://www.excellencethroughstewardship.org/.

## PIONEER TECHNOLOGY USE AGREEMENT (TUA)

Pioneer has a long history of investing in intellectual property to provide growers with high performing varieties and industry leading services. Our continued commitment to product research results in brand products that consistently deliver high yield potential with the objective to increase a grower's profitability. Pioneer® brand is the flagship seed brand of Corteva Agriscience and it uses patents and Plant Variety Protection (PVP) laws to protect our investment in patented germplasm, native and transgenic traits, and breeding technologies. PVP laws give breeders exclusive control over plant varieties for up to 20 years, enabling Corteva Agriscience to bring new products to the marketplace supported by improved technology. It is important to note that Pioneer product offerings, even if not biotech, can carry multiple types of intellectual property protection, such as patented genetics, patented breeding technologies, plant variety protection, patented transgenic traits, and patented native traits, including through the terms and conditions of use found in the Pioneer TUA. The purchase of any Corteva Agriscience variety or trait is done so under license with certain limitations. By using the seed supplied in connection with a Pioneer Technology Use Agreement, you agree to the fact that the seed – and technology within that seed – includes subject matter owned by Corteva Agriscience, or licensed from a third party, that is protected under U.S. intellectual property laws. Under this contract, you agree to a single-commercial planting of the seed and agree to not bin run or save your seed.

### Why is a TUA required?

- A TUA is required for the purchase of any Pioneer® brand seed - all crops, biotech and non-biotech. The TUA serves as an agreement between the customer and Pioneer demonstrating that the customer understands and agrees to follow all license terms, stewardship and applicable legal responsibilities related to their seed products.

- Even though some products do not contain biotech traits, the TUA protects the intellectual property associated with non-biotech products such as germplasm and other intellectual know-how and patents.

- The TUA grants a limited license for the grower to use/plant Pioneer® brand seed containing Corteva Agriscience sourced technologies (including germplasm, non-biotech traits, and biotech traits) and produce a single commercial crop.

- The TUA requires growers to use and follow the applicable Product Use Guide which can be obtained on the Pioneer website (www.pioneer.com/za) and official product labels (seeds and herbicides).

- The TUA prohibits certain activities such as saving seed or the use of unauthorised herbicides on herbicide tolerant crops (where applicable).

- By abiding by your Pioneer Technology Use Agreement, you are enabling Pioneer to continue to invest in advances in genetics and technology that bring forward new research discoveries. These discoveries ultimately help you increase production and meet new pest and production challenges.

- It is required by biotechnology laws and regulations for the supplier and purchaser who intend to use the technology to enter into a lawful agreement by signing a TUA.

The Pioneer TUA allows farmers to purchase and plant Pioneer® brand products containing certain technology traits. Such an agreement should be signed every season and be handed over to the Pioneer sales professional immediately before seed can be issued.

The TUA also stipulates that:

- Any grower who has not signed a TUA must immediately notify Pioneer and make arrangements to sign the TUA or return the seed to the company.

- Licensed biotech seed products are to be used solely for planting a single commercial crop and shall not be exported for planting in another country or supplied to any other person for planting

- Any purchase of licensed biotech seed products by a grower who is not a Pioneer licensed grower (i.e. did not sign a TUA) shall be void.

## GROWING CONVENTIONAL AND BIOTECH CROPS

For decades, multiple agricultural systems have coexisted successfully around the world from production through supply chains. Over time, best practices to facilitate these different agricultural systems have developed and have been improved continuously to ensure that high-purity and high-quality seed and grain are available to support trade from various agricultural systems.

One example of such coexistence is the production of similar commodities in close proximity such as field maize, sweet corn, white maize and popcorn. Coexistence strategies should meet market requirements using science-based industry standards and management practices, and should be flexible to facilitate options and choices for growers and the food and feed supply chain. This flexibility should also include the ability of co-existence strategies to be modified as changes in products, markets or practices occur.

The ongoing success of coexistence strategies depended upon co-operation, communication, flexibility and mutual respect for each cropping system and among growers using these various systems. Over the years, growers have adapted to changes and innovations in agriculture by using new farm management practices, new technologies and other appropriate practices. It is incumbent upon a grower who is growing a crop to satisfy a particular market and to implement best practices to satisfy those market standards. By seeking to satisfy that market, the grower inherently agrees to use the appropriate practices to ensure the integrity and marketability of his or her crop in the market in which he or she seeks to market it. This is true, regardless of the particular market being served, whether it is white maize, sweet corn, organically produced corn or conventionally produced corn. In each of these cases, the grower is producing a crop supported by a special market price and therefore, assumes responsibility for meeting any applicable market specifications to receive the applicable premium price from that market. Even though the responsibility rests with the grower producing the crop for a particular market, it is each grower's responsibility to communicate with, and be aware of the planting intentions of his or her neighbours to gauge the need for any appropriate best management practices.

## IDENTITY PRESERVED (IP) CROPS

IP crops are crops produced to meet the needs of specialised end-use markets. These crops are grown with a specific end use in mind, such as waxy, white and organic, amongst others, and should meet the defined requirements of that market. IP crops provide benefits for both the grower, with processor-paid incentives, as well as the end user. Growers who choose to preserve the identity of their crops to receive the additional end-use market value assume the responsibility of ensuring that their crops meet the contract specifications. To meet these specifications, the specialised end-use agricultural industry has developed generally accepted IP agricultural practices to manage IP production, as further described below. Accordingly, IP growers have the responsibility to implement any processes that are necessary to meet quality specifications. The special care required for IP crop production generally causes an increase in production costs that, in turn, causes an increase in the value of the goods sold.

## MAINTAINING THE INTEGRITY OF IP CROPS

In order to preserve the identity of IP crops, thorough clean-out procedures should be implemented before and after contact is made with the IP crop. This may include cleaning areas in seed storage bins, seed boxes (hoppers), transportation vehicles, combines and harvesters. Thorough clean-out procedures should be upheld throughout all aspects of the planting procedure, which include storage, transportation, planting and harvesting. Additionally, growers of IP crops should consider steps to minimise the potential for crosspollination given the generally recognised and accepted occurrence of the movement of incidental amounts of pollen. As previously stated, communication between growers is key in determining the best agricultural management practices that should be implemented to maintain the identity of IP crops.

## SEED TREATMENT STEWARDSHIP

Seed treatments, including fungicides, insecticides, nematicides and amendments, play a critical role in agriculture and the production of a healthy crop. In addition to managing early-season pests and diseases, they serve as a viable alternative to foliar and soil applications in some cases.

Seed treatment management and responsible stewardship play a vital role in sustaining our environment, while maximising crop health. Responsible stewardship practices help maintain seed and seed treatment integrity, which keeps the active ingredient on the seed to achieve the maximum crop health benefit for the investment. In addition, these practices help minimise the potential for adverse effects on producers and the environment, including pollinators which may be present at the time of planting.

The following best management practice suggestions are recommended:

### HANDLING

- Always read and follow the label directions and recommendations for proper handling and use of treated seed and seed treatments
- Use personal protection equipment as recommended on the product label or seed tag
- Follow all safety precautions as indicated on the label or seed tag
- Transport and transfer treated seed safely and in a manner that minimises the risk of spillage and dust

### PLANTING

- Always follow planter manufacturer recommendations and avoid excess use of talc and graphite
- Eliminate flowering plants and weeds in and around the field prior to planting.
- Limit dust movement from seed packages containing seed treatment. For example, consider factors such as wind speed and direction and avoid shaking the bottom of the treated seed bag when filling planting equipment
- Do not transfer treated seed next to active hives, at field margins, and adjacent to flowering plants and vegetation
- At planting, be aware of honeybees and hives located near the field, taking note of nearby hives and flowering plants and weeds, which could be attractive to pollinators and communicate with beekeepers when possible
- For pneumatic planters, direct the exhaust towards the soil surface
- Ensure all seeds are planted or incorporated into the soil at a proper planting depth

### DISPOSAL AND CLEAN-UP

- Follow national and local regulations for the disposal or storage use of unused seed
- Properly dispose of unused treated seeds, seed packaging or containers in accordance with national and local regulations and the container management return policy as advised by CropLife South Africa.
- Clean the planting equipment in a manner that minimises dust
- Avoid cleaning the planting equipment next to active hives, at field margins, and adjacent to

## GUIDE FOR THE USE OF BIOTECHNOLOGY PRODUCTS

This guide contains information for proper Insect Resistance Management for Pioneer® brand maize that contains the Pioneer Insect Protection Technologies – also referred to as the Biotech Traits. The Biotech Traits include:

**NB: Table 1**: The protective proteins (insect protection and herbicide tolerance traits) and the genetic material necessary for the expression of protective proteins are approved as safe for humans, animals and the environment in terms of the *GMO*

| PRODUCTS | PRODUCT USE STATEMENT |
|---|---|
| Bt Trait (corn borer technology) | The product Bt trait technology contains ***cry1A(b)*** gene obtained from ***Bacillus thuringiensis var. kurstaki.*** The ***cry1A(b)*** protein produced in this maize provides control of susceptible stalk borers, ***Busseola fusca*** and ***Chilo partellus.*** |
| YieldGard® Maize 2 technology (MON89034) | The product YieldGard® Maize 2 technology contains ***cry1A.105*** and ***cry2Ab2*** genes from ***Bacillus thuringiensis var. kurstaki.*** Cry1A.105 and Cry2Ab2 proteins produced in this maize provide control of susceptible maize stalk borers, ***Busseola fusca*** and ***Chilo partellus.***<br><br>YieldGard® Maize 2 and the YieldGard® Maize 2 logo design are registered trademarks of Monsanto Technology LLC. |
| Roundup Ready® Maize 2 technology (NK603) | The product Roundup Ready® Maize 2 technology contains ***cp4 epsps*** gene from ***Agrobacterium*** strain CP4. Roundup Ready® Maize 2 technology produces CP4 EPSPS protein which provides tolerance to registered glyphosate formulations.<br><br>**WARNING:** The Roundup Ready® gene will safeguard this hybrid ONLY against applications of approved glyphosate products such as Roundup PowerMax® (L 6702), when applied at labelled rates. The Roundup Ready® gene WILL NOT safeguard this hybrid against applications of other herbicides which require a different herbicide resistance gene. Always read and follow herbicide label directions prior to use. Roundup Ready®, the Roundup Ready® logo and Roundup PowerMax® are registered trademarks of Monsanto Technology LLC. |
| Intrasect® insect protection technology (TC1507xMON810xNK603) | The product Intrasect® insect protection technology contains the Herculex® I insect protection trait that produces a ***Bacillus thuringiensis*** (Bt) Cry1F protein and also contains the Bt trait technology that produces a Bt ***cry1Ab*** protein which provide protection against susceptible maize borers ***Busseola fusca*** and ***Chilo partellus.*** Product responses may vary by location, pest population, environmental conditions, and agricultural practices. This product also contains the Roundup Ready® Maize 2 technology with gene ***cp4 epsps*** from Agrobacterium strain CP4. The CP4 EPSPS protein provides tolerance to registered glyphosate formulations. This product is protected by one or more patent rights. Roundup Ready® Maize 2 technology provides tolerance to registered glyphosate formulations.<br><br>**WARNING:** The Roundup Ready® gene will safeguard this hybrid ONLY against applications of approved glyphosate products such as Roundup PowerMax® (L 6702), when applied at labelled recommended rates. The Roundup Ready® gene WILL NOT safeguard this hybrid against applications of other herbicides which require a different herbicide resistance gene. Always read and follow herbicide label directions prior to use. ACCIDENTAL APPLICATIONS OF INCOMPATIBLE HERBICIDES TO THIS HYBRID COULD RESULT IN TOTAL CROP LOSS. Roundup Ready® and Roundup PowerMax® are registered trademarks used under license from Monsanto Technology LLC. |
| PoweCore™ technology (MON89034xTC1507xNK603) | The product PowerCore™ technology trait produces the active ingredients Cry1A.105, Cry2Ab2, and Cry1F, proteins from ***Bacillus thuringiensis*** which provides good control over spotted stalk borer ***(Chilo partellus)*** and the maize stalk borer ***(Busseola fusca)***. In addition, this seed contains Roundup Ready® Maize 2 technology which provides tolerance to registered glyphosate-based herbicides. Product responses may vary by location, pest population, environmental conditions, and agricultural practices. This product is protected by one or more patent rights. PowerCore™ multi-event technology developed by Corteva Agriscience and Monsanto. PowerCore™ is a trademark of Monsanto Technology LLC.<br>Roundup Ready® Maize 2 is a registered trademark of Monsanto LLC.<br>Always read and follow herbicide label directions prior to use. All herbicides used with this product must be properly registered with the Department of Agriculture, Land Reform and Rural Development in terms of the Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act No. 36 of 1947 (as amended) and used in accordance with herbicide registered label and recommendations and all other applicable laws.<br><br>**WARNING:** The Roundup Ready® gene will safeguard this hybrid ONLY against applications of approved glyphosate products such as Roundup PowerMax® (L 6702), when applied at labelled rates. The Roundup Ready® gene WILL NOT safeguard this hybrid against applications of other herbicides which require a different herbicide resistance gene. Always read and follow herbicide label directions prior to use.<br><br>**THE ACCIDENTAL APPLICATION OF INCOMPATIBLE HERBICIDES TO THIS HYBRID COULD RESULT IN TOTAL CROP LOSS.** |

## IMPORTANT – READ BEFORE PLANTING

## WHAT ARE PIONEER INSECT PROTECTION TECHNOLOGIES?

Pioneer insect protection technologies and/or the licensed Biotech Traits allow farmers to plant Pioneer brand maize with built-in protection to control important maize stalk-borer insect pests. Pioneer brand maize with the insect protection technology confers protection against susceptible *Busseola fusca* (maize stalk borer) and *Chilo partellus* (spotted stalk borer).

Note: These insects will be referred to collectively as 'stalk borers' throughout the balance of this document.

## EFFECTIVENESS OF PIONEER® BRAND MAIZE HYBRID WITH THE BIOTECH INSECT PROTECTION TECHNOLOGY

## STALK BORER TECHNOLOGY

The *Busseola* stalk borer is not easily controlled. Please note that, in general, the population pressure of stalk borers is higher during the reproductive phase of the plant (window period – VT to R1 stage) compared with the first generation that infests the plants in an earlier growing phase. Stalk borer resistance is therefore scored lower for the window period compared to the first generation.

It is important to carefully monitor fields for all pests to determine whether treatment with a pest control method is needed. Scouting techniques and remedial pest control treatments should address the fact that larvae must hatch and feed before incorporated plant protection technologies have an effect on the pests. Scouting should be performed regularly, particularly after periods of heavy or sustained egg laying (especially during bloom), to determine whether larval survival is significant in a particular field. If unexpected damage is observed, contact your Pioneer agronomist.

## INSECT RESISTANCE MANAGEMENT (IRM)

### What is IRM?

Insecticide Resistance Management (IRM) program is an essential part of good stewardship. The aim of an IRM program is to reduce the probability of target insects developing increased tolerance to the insecticidal Bt proteins, thus maximizing the longevity and effectiveness of these valuable traits in an environmentally-conscious way. Sustainable preservation of this technology places individual responsibility on all role players in the seed distribution system - from the seed supplier to the grower planting the seed. Additionally, IRM is a legal obligation for all as stipulated in the commercial permit granted by South Africa regulatory authorities for all Bt corn products.

## THE IMPORTANCE OF INSECT RESISTANCE MANAGEMENT (IRM)

Compliance with IRM requirements is a stewardship obligation and is critical to maintaining the longevity and effectiveness of maize with Biotech Traits. When maize with licensed biotech insect protection technology is the only crop being cultivated, only the rare resistant individuals of an insect pest population will survive and mate with each other, producing resistant offspring. To delay the development of resistance within insect pest populations to maize with biotech insect protection technology, growers planting Pioneer® brand maize with the technology are required to also plant a separate area of Pioneer brand maize without the technology, known as a 'refuge'.

### What is a refuge?

A refuge is a block or strip of maize without biotech insect protection technology . The primary purpose of a refuge is to maintain a population of stalk borers that are susceptible to the biotech insect protection technologies. This increases the probability that the rare resistant pest individuals emerging from fields planted with the biotech insect protection technology will mate with susceptible pest individuals emerging from the refuge. This will result in pest offspring that are susceptible to biotech insect protection technologies. Please refer to *Figure 2* which illustrates this concept.

## REFUGE MANAGEMENT FOR PIONEER® BRAND MAIZE WITH Bt INSECT PROTECTION TECHNOLOGY

**Table 2**: Planting a refuge is a requirement for growing the technology and is a primary component of IRM. There are two acceptable refuge options:

| PRODUCTS | REFUGE REQUIREMENTS | INSECT PROTECTION |
|---|---|---|
| Bt Trait<br>YieldGard® Maize 2 technology (MON89034)<br>Intrasect® insect protection technology | ✓ 95% Biotech insect protection technology with an accompanying 5% refuge – with this option, no chemical control for targeted insects is permitted on the refuge areas<br>**or** | *Busseola fusca* (maize stalk borer) and *Chilo partellus* (spotted stalk borer) |
| PowerCore™ technology | ✓ 80% Biotech insect protection technology with an accompanying 20% refuge – with this option, chemical control of targeted insects is permitted on refuge areas if economic thresholds are met. | |

- Maize refuge options include (i) hybrids without stalk borer biotech insect protection technologies, (ii) hybrids with Roundup Ready® Maize 2 technology, and (iii) conventional maize.
- Pioneer® brand maize with stalk borer biotech insect protection technology and refuge hybrids must be of similar maturity.
- The refuge must be planted within seven (7) days, under the same growing conditions as the hybrid with stalk borer biotech insect protection technologies. For example, if the hybrid with any of the insect protection technologies is planted under irrigation, the refuge must also be under irrigation and planted within 7 days of planting the stalk borer insect protection technology hybrid.
- The refuge area must be closer than 400m from the furthest point of the field containing Pioneer brand maize with any of the stalk borer biotech insect protection technologies (as shown on *Figure 2*).
- **A neighbour's field does NOT qualify as a refuge.**
- Mixing of seed containing stalk borer biotech insect protection technologies with seed without the stalk borer trait is NOT an acceptable refuge design.
- Planter bins should be properly cleaned before switching from seed containing stalk borer biotech insect protection technologies to seed without the stalk borer trait, and vice versa.
- Avoid the presence of volunteer plants with stalk borer biotech insect protection technologies in the refuge area.
- Field Monitoring and scout fields frequently:

✓ Monitoring Bt fields for insect resistance development is an integral part of an IRM plan. If resistant populations are detected early, alternative control measures can be implemented to reduce the population and halt the spread of resistance.
✓ Immediately report to the authorised Pioneer sales professional if unexpected damage is observed with biotech insect protection technologies.
✓ Apply only registered products when advise.

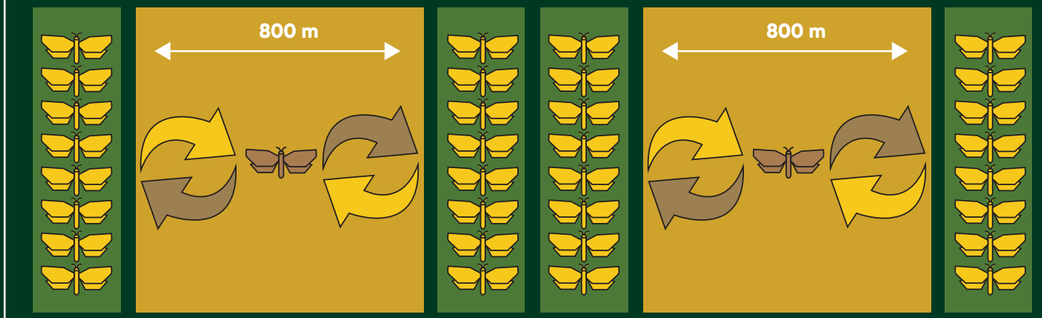
# REFUGE MANAGEMENT

FOR PIONEER® BRAND MAIZE WITH Bt INSECT PROTECTION TECHNOLOGY
**PLANT THE CORRECT REFUGE AREA FOR BT-MAIZE**

**STEP 1:** Choose the best option for your farm.

OPTION A: 95% Bt, 5% non-Bt
No chemical control of stalk borer in refuge.

OPTION B: 80% Bt, 20% non-Bt
Chemical control of stalk borer in refuge allowed.




**STEP 2:** Regardless of the option chosen above, your refuge must be planted in the following manner:

**STEP 3:** Regularly monitor and inspect (weekly) your Bt crop and immediately contact your seed representative/agent if stalk borer infestation is observed in the Bt maize.

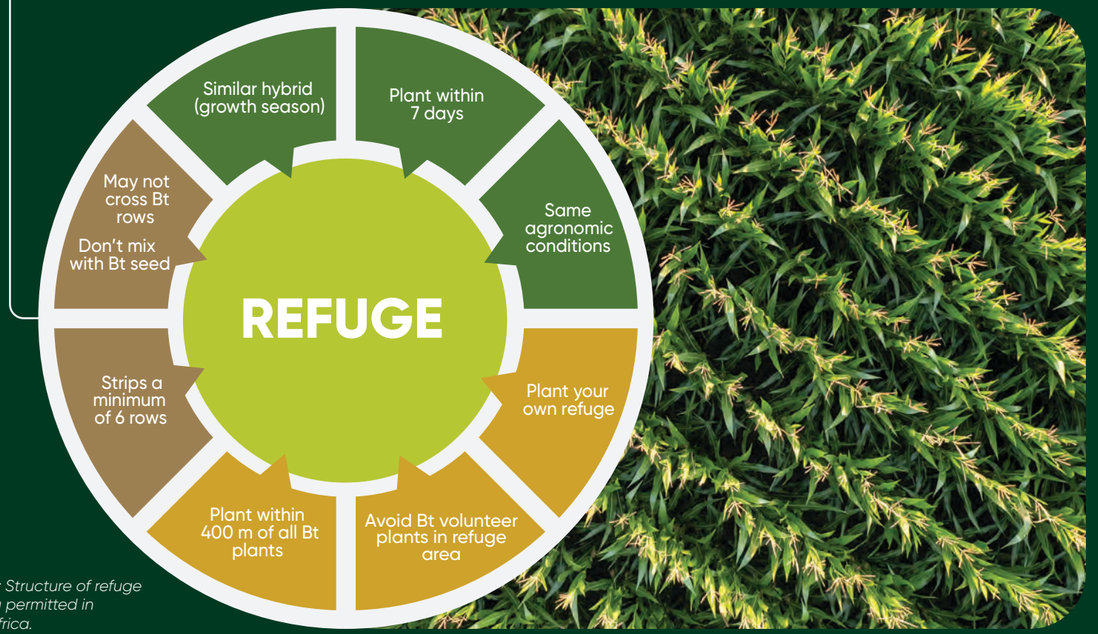
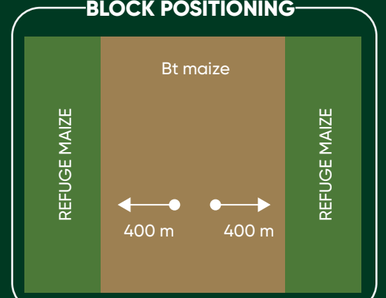


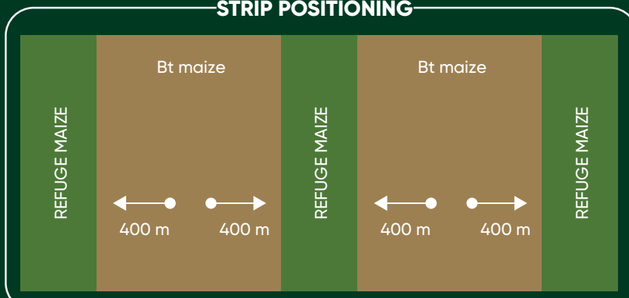

*Figure 2: Structure of refuge planting permitted in South Africa.*

# CORRECT LAYOUT OF THE **REFUGE AREA**

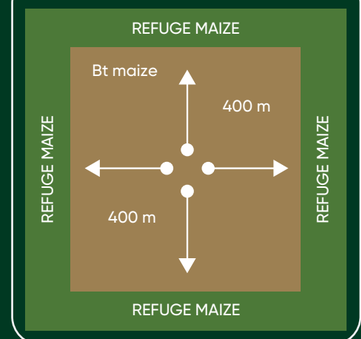
**BLOCK POSITIONING**



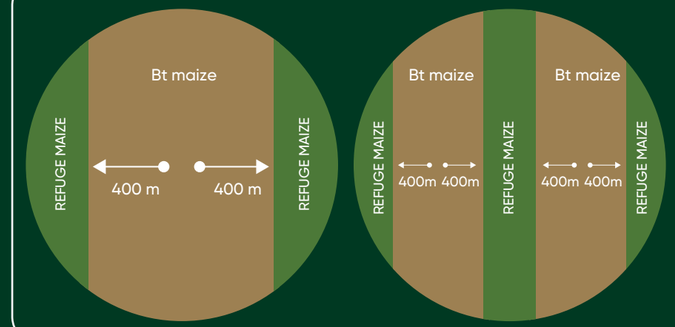

**STRIP POSITIONING**



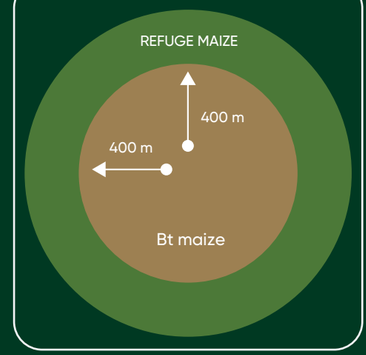

**PERIMETER POSITIONING**




**PIVOT POSITIONING**




**BORDERING OF PIVOT**




| Pivot Size | | Minimum number of rows required per row width in m (5% refuge) | | | | | |
|---|---|---|---|---|---|---|---|
| Radius (m) | ha | 0,60 m | 0,75 m | 0,91 m | 1,00 m | 1,20 m | 1,50 m |
| 178 | 10 | 8 | 6 | 6 | 6 | 6 | 6 |
| 252 | 20 | 11 | 9 | 7 | 6 | 6 | 6 |
| 309 | 30 | 13 | 10 | 9 | 8 | 7 | 6 |
| 357 | 40 | 15 | 12 | 10 | 9 | 8 | 6 |
| *399 | 50 | 17 | 13 | 11 | 10 | 8 | 7 |
| *437 | 60 | 18 | 15 | 12 | 11 | 9 | 7 |
| *472 | 70 | 20 | 16 | 13 | 12 | 10 | 8 |
| *505 | 80 | 21 | 17 | 14 | 13 | 11 | 9 |
| *535 | 90 | 23 | 18 | 15 | 14 | 11 | 9 |
| *564 | 100 | 24 | 19 | 16 | 14 | 12 | 10 |
| *592 | 110 | 25 | 20 | 16 | 15 | 12 | 10 |
| *618 | 120 | 26 | 21 | 17 | 16 | 13 | 10 |

* Producer must also plant at least 6 rows in the centre of the pivot, in addition to the rows outside.

## BEST PRACTICES FOR FOLLOWING INTEGRATED PEST MANAGEMENT (IPM)

Integrated Pest Management (IPM) enables growers to adapt their approach to the management of weeds, insects, and diseases to the specific conditions within their fields, in lieu of a generic pest management program. IPM involves the responsible use of biotech traits, crop protection products, and cultural management practices. The value of any biotech trait or insecticide spray programme can be enhanced when used within the context of an IPM program.

Pioneer recommends implementing the following IPM best practices to maximise the value of biotech traits:

- Rotation of crops and biotech traits to prevent the build-up of pest populations over multiple seasons and the evolution of resistance within pest populations.
- The use of seed varieties, planting technology, and seedling rates that are appropriate for a given crop in a particular geographic area.
- Monitoring of pest populations throughout the growing season to determine when treatment for pest control is necessary (i.e., when pest damage exceeds action thresholds).
- Using a combination of pest management practices to control pest populations.
- Ensuring the appropriate crop sanitation practices are conducted throughout the growing season and the destruction of crop residues is completed promptly after harvesting.
- Minimizing over-wintering populations of pests through soil management practices.
- The use of multiple modes of action of crop protection products within a season to reduce the likelihood of pest resistance development.
- Regular scouting of the crops containing biotech insect protection technologies for unexpected damage caused by ***Busseola fusca*** or ***Chilo partellus***. (Immediately report any occurrence of unexpected damage to an authorised Pioneer sales professional.)

## IPM SPRAY PROGRAMME

Pioneer implements an IPM programme to help farmers maximise the yield of their high yield potential Pioneer® brand maize hybrids with the Intrasect® Insect Protection technology and Bt trait stalk borer technology. **Note** that the IPM programme is not applicable to YieldGard® Maize 2 (MON89034 maize) and PowerCore™ technology fields.

To qualify for the benefits of the programme, customers need to adhere to the following:

- Sign the Technology Use Agreement (TUA) for every purchase and return the signed copy to Pioneer.
- Refuge areas must be planted according to the prescribed guidelines contained in the TUA and this brochure.

NON-COMPLIANCE with any of the above requirements will disqualify the farmer from the IPM programme incentives

Growers must take note of the following conditions applicable to the Pioneer IPM Programme:

- Insecticide sprays are implemented at >5% damage (before the tassel formation growth stage).
- The IPM spray programme DOES NOT apply to MON89034 (YieldGard® Maize 2 technology) maize or PowerCore™ technology maize.
- If unexpected insect damage is observed on MON89034 or PowerCore™ technology maize plants, a Pioneer sales professional or agronomy team member must be contacted to provide advice and appropriate remedial actions.
- Only insecticide costs are covered, and NO application costs will be covered by the spray programme.
- This programme covers one spray per season (not per target pest).

Any person who participates in the IPM insecticide spray programme must first enrol for the programme and receive procedure manuals. Please consult your seed sales agent for additional information regarding specific details (protocols) of the IPM programme.

## BEST PRACTICES FOR MANAGING HERBICIDE-TOLERANT CROPS

## IMPORTANT – READ BEFORE PLANTING

### WHAT IS HERBICIDE-TOLERANT SEED TECHNOLOGY?

Herbicide-tolerant crops can tolerate herbicide applications at product recommended application rates that will kill non-herbicide-tolerant Pioneer® brand maize or varieties of the same crop species. Crops with traits for herbicide tolerance allow farmers to apply herbicides to their crops that they would otherwise be unable to utilise, without causing death or unacceptable injury to that crop.

### IMPORTANCE OF MANAGING HERBICIDE-TOLERANT CROPS AND WEED RESISTANCE TO HERBICIDES

Properly managing herbicide-tolerant crop technology is important to preserve the long-term effectiveness and value of the tolerant crop seed and its corresponding herbicides. Growers utilising herbicide programmes that include herbicide-tolerant crops can do so on an annual basis provided the technology is managed effectively.

### BEST PRACTICES

- The use of herbicide-tolerant crops does not limit the grower to use only one herbicide product. Conventional herbicides can and should still be part of the grower's overall weed management system.
- Limit the number of applications of a single herbicide or herbicides from the same mode of action family within a single growing season.
- Use mixtures or sequential treatments of an effective alternative mode of action to control target weeds, as recommended on the label(s).
- Apply herbicides at recommended dosages and at the recommended stage of weed growth, as stated on the label(s).
- Use alternative weed management practices such as crop rotation, mechanical cultivation, delayed planting and weed-free crop seed.
- Clean equipment before moving between fields to minimise the dispersion of weed seed.
- Scout fields after herbicide application to detect weed escapes or shifts. If a potentially resistant weed or weed population has been detected, use available control methods to avoid seed dispersion in the field.

### MANAGING VOLUNTEER HERBICIDE TOLERANT CROPS

The seed of some crops can escape harvest, germinate the following year and become 'volunteer weeds' in a rotational crop. This can happen regardless of whether the crop seed was herbicide-tolerant or not. Many tools are available for managing herbicide-tolerant volunteers, but advanced planning is advised to ensure the greatest adaptability and success.

The best strategies for managing herbicide tolerant volunteers are crop rotation and rotation of herbicides with different modes of action. The proper adjustment of harvesting equipment and the cultivation and tillage management will also help reduce volunteer plants from previous crops. Plan at least a year ahead when planting an herbicide-tolerant crop to make sure you have a weed management plan that will control any herbicide-tolerant volunteers, using alternative herbicides with different mode-of-action families and/or tillage for the next crop.

### HERBICIDES RESISTANT WEED

Grower awareness and proactive management of herbicide resistant weeds are part of a successful weed control program. Suspected herbicide resistance is defined as the situation where the following three indicators occur at a site or location:

- Failure to control a weed species normally controlled by the herbicide at the dose applied (as per label recommendation), especially if control is achieved on adjacent weeds.
- A spreading patch of non-controlled plants of a particular weed species; and
- Surviving plants mixed with controlled individuals of the same species.

Possible indicators of weed resistance to herbicides include achieving good control of all but one of the labelled weed species in the field with the herbicide, and/or failure of repeated applications of the same herbicide to control only that weed species in a field.

Take note that weed control failures can have many causes that are not necessarily related to herbicide resistance. Lack of rainfall to activate pre-emergence herbicides, rainfall right after post-emergence applications that wash the herbicide off the plant, cool temperatures, slow growth reducing herbicide activity in the plant, improper application timing, or improperly calibrated application equipment are amongst the many causes of less-than-expected herbicide performance. If you suspect a weed control failure is caused by weed resistance to an herbicide, you should first contact your herbicide retailer's or herbicide manufacturer's representative and your local Pioneer agronomist and conduct a thorough investigation that can eliminate other more common causes of poor weed control. Your local Pioneer agronomist will assist you with the additional steps that will be required if weed resistance to the herbicide is believed to be the issue.

If you have any questions after reviewing this information, please contact your authorised seed dealer or agronomist

Pioneer® brand products are provided subject to the terms and conditions of purchase which are part of the labelling and purchase documents.

Corteva Agriscience RSA (Pty) Limited, PO Box 8010, Centurion, 0046, Gauteng, Republic of South Africa.



ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. Roundup Ready® crops contain genes that confer tolerance to glyphosate, the active ingredient in Roundup® brand agricultural herbicides. Roundup® brand agricultural herbicides will kill crops that are not tolerant to glyphosate.

Roundup Ready® Maize 2 and YieldGard® Maize 2 are registered trademarks of Monsanto Technology LLC. PowerCore™ multi-event technology is developed by Corteva Agriscience and Monsanto. PowerCore™ is a trademark of Monsanto Technology LLC.

YieldGard® MAIZE 2 Roundup Ready® MAIZE 2 Intrasect® POWERCORE™

# WE ARE SMART **SEED**

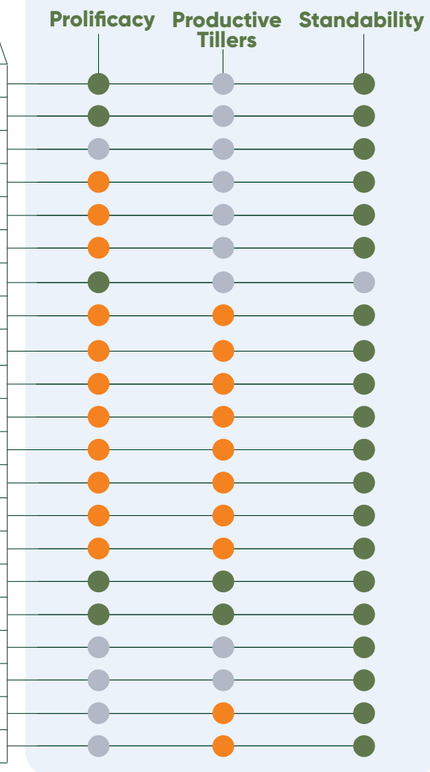
## SEED CHARACTERISTICS & RATINGS
MAIZE, SOYBEAN & SUNFLOWER

## YELLOW MAIZE

### SEED INFORMATION

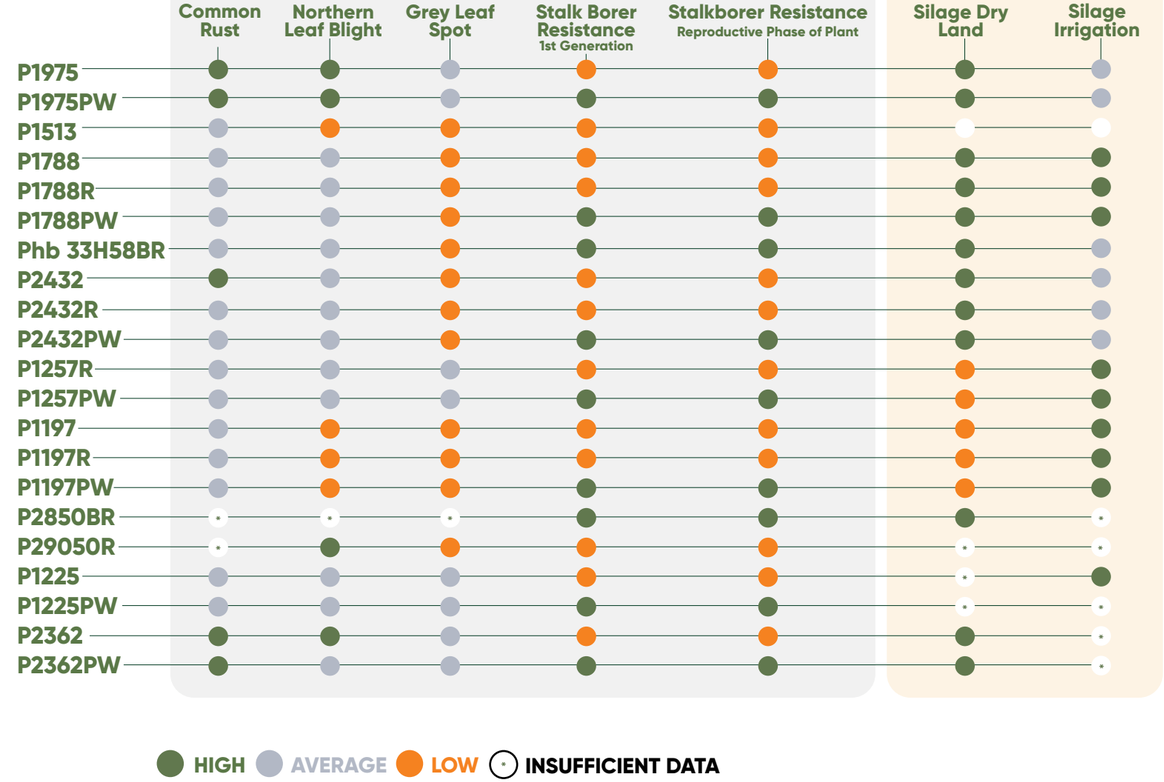
| PRODUCTS | Mon89 / Mon810 | Technology | CRM | Irrigation | Dry Land |
|---|---|---|---|---|---|
| **P1975** | | | 120 | No | Yes |
| **P1975PW** | | PW | 121 | No | Yes |
| **P1513** | | | 114 | No | Yes |
| **P1788** | | | 116 | Yes | Yes |
| **P1788R** | | RR2 | 116 | Yes | Yes |
| **P1788PW** | | PW | 117 | Yes | Yes |
| **Phb 33H58BR** | Mon89 | VTP, RR2 | 115 | No | Yes |
| **P2432** | | | 122 | No | Yes |
| **P2432R** | | RR2 | 122 | No | Yes |
| **P2432PW** | | PW | 124 | No | Yes |
| **P1257R** | | RR2 | 112 | Yes | No |
| **P1257PW** | | PW | 112 | Yes | No |
| **P1197** | | | 111 | Yes | No |
| **P1197R** | | RR2 | 111 | Yes | No |
| **P1197PW** | | PW | 112 | Yes | No |
| **P2850BR** | Mon89 | VTP, RR2 | 128 | No | Yes |
| **P29050R** | | RR2 | 129 | No | Yes |
| **P1225** | | | 114 | Yes | No |
| **P1225PW** | | PW | 115 | Yes | No |
| **P2362** | | | 123 | No | Yes |
| **P2362PW** | | PW | 124 | No | Yes |

### CHARACTERISTIC RATINGS




### DISEASE TOLERANCE AND INSECT RESISTANCE

### SILAGE




HIGH AVERAGE LOW INSUFFICIENT DATA

GOOD AVERAGE WEAK

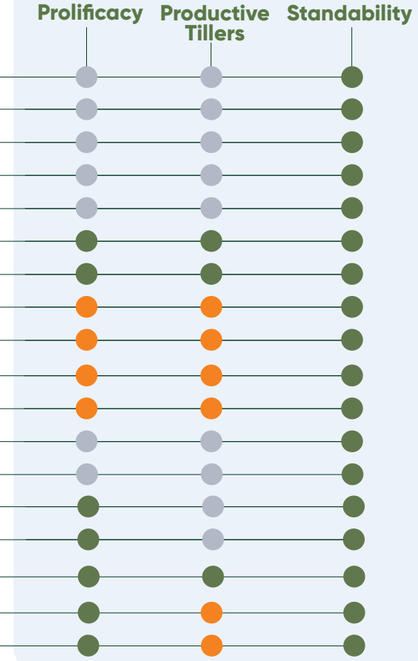
RR2 = Roundup Ready® Maize 2-gene
YGII = YieldGard® Maize 2-technology (VTP)
PW = PowerCore™ technology

# WHITE MAIZE

## SEED INFORMATION

| PRODUCTS | Mon89 / Mon810 | Technology | CRM | Irrigation | Dry Land |
|---|---|---|---|---|---|
| **P2553W** | | | 123 | No | Yes |
| **P2553WR** | | RR2 | 123 | No | Yes |
| **P2555WBR** | Mon89 | VTP, RR2 | 123 | No | Yes |
| **P2927WR** | | RR2 | 129 | No | Yes |
| **P2927WYR** | Mon810 | YG, RR2 | 129 | No | Yes |
| **P2565WR** | | RR2 | 125 | No | Yes |
| **P2565WPW** | | PW | 125 | No | Yes |
| **P14197WPW** | | PW | 115 | Yes | No |
| **P1517W** | | | 116 | Yes | No |
| **P1517WR** | | RR2 | 116 | Yes | No |
| **P2369W** | | | 121 | Yes | Yes |
| **P2383W** | | | 124 | No | Yes |
| **P2383WPW** | | PW | 124 | No | Yes |
| **P2849WPW** | | PW | 128 | No | Yes |
| **P2885WBR** | Mon89 | VTP, RR2 | 128 | No | Yes |
| **P28899WR** | | RR2 | 128 | No | Yes |
| **P2863WR** | | RR2 | 128 | No | Yes |
| **P2851WR** | | RR2 | 128 | No | Yes |

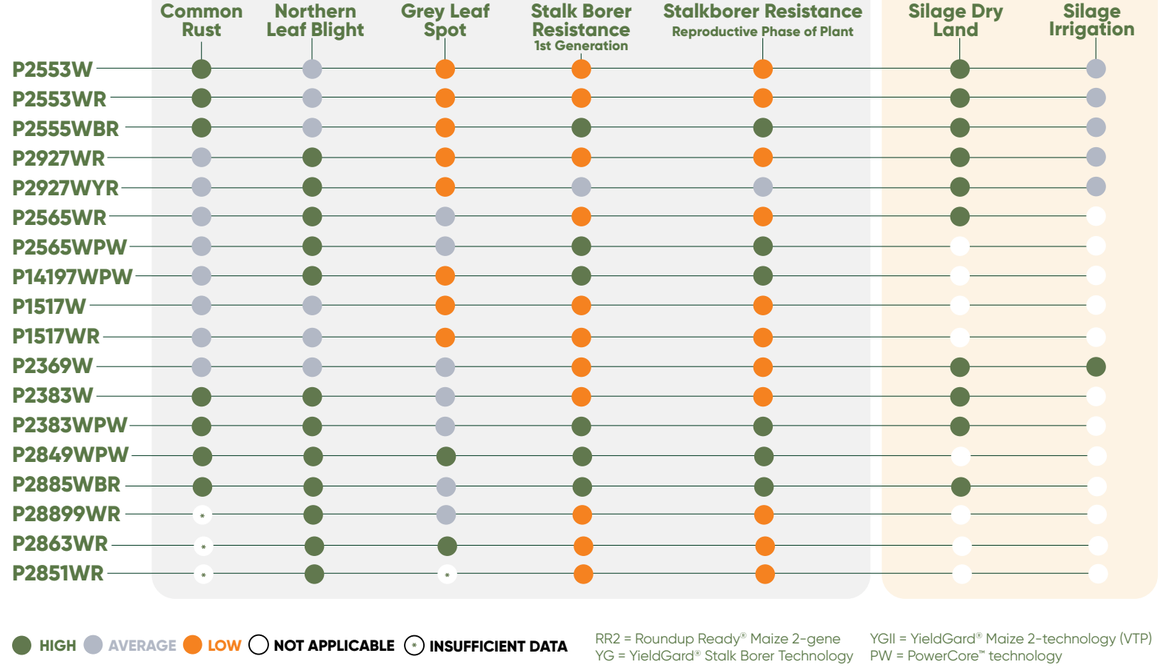
## CHARACTERISTIC RATINGS




GOOD AVERAGE WEAK

## DISEASE TOLERANCE AND INSECT RESISTANCE

## SILAGE




HIGH AVERAGE LOW NOT APPLICABLE INSUFFICIENT DATA

RR2 = Roundup Ready® Maize 2-gene
YG = YieldGard® Stalk Borer Technology

YGII = YieldGard® Maize 2-technology (VTP)
PW = PowerCore™ technology

# SOYBEAN

## SEED INFORMATION

| PRODUCTS | Technology | VRV | Irrigation | Dry Land | Relative Days to 50% Flower | Relative Days to Harvest Ready | Habit of Growth |
|---|---|---|---|---|---|---|---|
| **P48T48R** | Glyphosate tolerant | 4,8 | Yes | Yes | 42-63 | 111-138 | Indeterminate |
| **P51T42R** | Glyphosate tolerant | 5,1 | Yes | Yes | 48-66 | 124-140 | Indeterminate |
| **P52T52R** | Glyphosate tolerant | 5,2 | Yes | Yes | 48-66 | 124-140 | Indeterminate |
| **P59T03R** | Glyphosate tolerant | 5,9 | Yes | Yes | 50-68 | 128-147 | Indeterminate |
| **P62T16R** | Glyphosate tolerant | 6,2 | Yes | Yes | 50-70 | 125-150 | Indeterminate |
| **P64T39R** | Glyphosate tolerant | 6,4 | Yes | Yes | 50-72 | 132-154 | Indeterminate |
| **P71T74R** | Glyphosate tolerant | 7,1 | Yes | Yes | 55-95 | 138-190 | Indeterminate |

● **SINGLE SEASON**

## CHARACTERISTIC RATINGS

| | Shattering Resistance | Hypocotyl Length | Standability | Plant Height (cm) | Pod Height (cm) |
|---|---|---|---|---|---|
| **P48T48R** | ● | ● | ● | 73 | 10 |
| **P51T42R** | ● | ● | ● | 80 | 12 |
| **P52T52R** | ● | ● | ● | 80 | 14 |
| **P59T03R** | ● | ● | ● | 90 | 14 |
| **P62T16R** | ● | ● | ● | 92 | 14 |
| **P64T39R** | ● | ● | ● | 98 | 17 |
| **P71T74R** | ● | ● | ● | 101 | 16 |

## COLOUR

| | Hilum Colour | Flower Colour |
|---|---|---|
| **P48T48R** | Black | White |
| **P51T42R** | Grey | Purple |
| **P52T52R** | Brown | Purple |
| **P59T03R** | Buff | White |
| **P62T16R** | Buff | White |
| **P64T39R** | Yellow** | White |
| **P71T74R** | Yellow** | White |

● **GOOD** ● **AVERAGE** ● **WEAK**

** Disclaimer: The expression of yellow hilum colour can vary from colourless to light brown depending on the influence of production environment.

# SUNFLOWER

## SEED INFORMATION

| PRODUCTS | Relative Days to 50% Flower (5.5) | Relative Days to Physiological Ripeness (9) | Plant Height (cm) |
|---|---|---|---|
| **P 65LP65**** | 70-75 | 121-135 | 180-200 |
| **P 65LL02** | 69-78 | 120-135 | 180-200 |
| **P 65LP54**** | 67-72 | 112-122 | 175 |
| **P 65LL46** | 64-70 | 111-118 | 165-190 |
| **P 65LL25** | 67-74 | 116-125 | 170-190 |

## CHARACTERISTIC RATINGS

| | Head: Curvature & Placement | Head: Form | Yield Potential | Uniformity |
|---|---|---|---|---|
| P 65LP65** | 5,7 | GOOD | GOOD | 7,8 |
| P 65LL02 | 5,8 | GOOD | AVERAGE | 5,5 |
| P 65LP54** | 7 | GOOD | AVERAGE | 5,7 |
| P 65LL46 | 5,5 | GOOD | GOOD | 7,5 |
| P 65LL25 | 7,5 | AVERAGE | GOOD | 6,3 |

** Clearfield Plus
Production System for Sunflower

® The unique Clearfield Plus Symbol is a registered trademark of BASF.
*Insufficient data

GOOD AVERAGE WEAK

## CHARACTERISTIC RATINGS

| | Seed Oil Concentration % |
|---|---|
| P 65LP65** | 40 |
| P 65LL02 | 41 |
| P 65LP54** | 38 |
| P 65LL46 | 41.2 |
| P 65LL25 | 43 |

## DISEASE RESISTANCE

| | *Brown Rust | *White Rust | Root & Stem Disease | Alternaria | Standability |
|---|---|---|---|---|---|
| P 65LP65** | HIGH | LOW | HIGH | HIGH | 8,1 |
| P 65LL02 | HIGH | AVERAGE | HIGH | AVERAGE | 7,8 |
| P 65LP54** | AVERAGE | HIGH | AVERAGE | HIGH | 6,6 |
| P 65LL46 | * | * | HIGH | * | 7 |
| P 65LL25 | * | * | * | * | 7,2 |

***Brown Rust** *(Puccinia Helianthi)*
***White Rust** *(Albugo Tragopogonis)*

HIGH AVERAGE LOW

# MAIZE SILAGE

## THE EVALUATION OF DIFFERENT HYBRIDS

The expectations placed on a good silage hybrid can differ greatly because of the producer's needs for use (for animal feeding it can be milk production), but the biggest need or expectation lies with the producers, animal nutritionist and contractors that are involved in the production of silage. The opinions of quantity versus quality when it comes to silage, are discussed regularly, but a good rule of thumb is the following:

1. High yield per hectare
2. High starch yield per Kg DM
3. High Total Digestible Nutrients (TDN)*

**Protein value** are measured and mentioned, but in our maize silage observations it is of less importance. Proteins in maize silage are mainly influenced by harvest time and the physiological phase of the maize plant.

***Total Digestible Nutrients (TDN)** of silage are measured from the digestibility of crude protein, fat and fiber (thus NDF and all fiber fractions), and non-structural carbohydrates (including starches). A good (high) TDN value are found with low fiber, high digestibility of all fiber fractions and a high starch content.

**Methods and Analytics**

A sample representing each hybrid was taken over the trials of three seasons. Sampling was conducted by following a protocol outlined by **AgSci Unlimited Silage Consultancy.** The protocol indicated the decision of cut stage, by cutting and drying the maize material, to determining the dry matter (DM)**, using measures and parameters during harvesting, taking of samples, ensiling and analyzing of fermented samples.

****Dry Matter (DM)** is shown as a percentage. Dry matter is the content of the sample that is free of moisture. Because moisture is the biggest component, it influences the amount fed and physical quantity of nutrients available to the animal, and it is important to always balance and evaluate the rations/ diets on a dry matter base.

**Laboratory**

All analysis was done in the laboratory **Labworld (Pty) Ltd in Isando, Johannesburg**; an affiliate of CVAS (Cumberland Valley Analytical Services) in the USA. NIR technology is used to measure the nutrition parameters of fermented silage.

**Statistics**

The "One-way analysis of variance" (ANOVA) procedure was used to show meaningful differences between the nutritional parameters, through the Tukey's Studentized Range test (HSD). The nutritional parameters are:

1. Dry Matter (DM)
2. Neutral Detergent Fiber (NDF)
3. NDF 30-hour digestibility
4. Starch
5. Total Digestible Nutrients (TDN)
6. Milk per ton

Meaningful differences were measured by ANOVA for the above six parameters. P-values were declared for < 0.0001.

**Fermentation**

All plants were cut at the R5 physiological stage. All silage trial samples fermented well. Therefor no comments can be made on ensiling ability of the different hybrids that were ensiled. By following and correctly applying the protocol, good ensilage was obtained.

**Results and feedback**

**NDF digestibility:**

Die NDF-fraction of crude fiber and the digestibility thereof (in this case the prediction after 30 hours in the rumen), are used as an indication of the type and usefulness of the fiber in the plant. Ruminants are masters in the use of fiber through microbial fermentation in the rumen, and it is because of this that ruminants are able to use these components so effectively, which leads to the point where we can make silage from the whole plant.

**Milk per ton:**

This is a specific calculation and is based on certain parameters from the laboratory used for the analysis (CVAS). This is an indication of how the silage can be used by dairy farmers.

**Are yellow or white maize better for silage?** There are mostly no differences between nutritional values, such as fiber levels or starch yields. What we need to do in silage production is to optimize the quantity and quality. If a white hybrid shows better quantity and quality than a yellow hybrid on a specific farm, it will be a good hybrid for silage.

**Norms of the different parameters measured in the laboratory:**

| Measured Objectives | Under Norm | On Norm | Above Norm |
|---|---|---|---|
| Neutral Detergent Fiber (NDF) | <37% | 37 - 42% | > 43% |
| NDF at 30 hours digestibility | <54% | 54 - 58% | >59% |
| Starch | <27% | 27 - 39% | >39% |
| Crude Protein (CP) | <6.5% | 6.5 - 9.2% | >9.2% |
| Total Digestible Nutrients (TDN) | <65% | 65 - 72% | >72% |

Concern Acceptable Strength

## Quality Results of Silage Trials over 3 years

| Cultivar | NDF | NDF at 30hrs digestibility | Starch | Crude Protein (CP) | TDN | Milk per ha (kilo-liter) |
|---|---|---|---|---|---|---|
| P1197 Platform | S | S | S | S | S | 31,7 |
| P1257 Platform | S | S | S | S | S | 32,2 |
| P1788 Platform | S | S | S | S | S | 30,1 |
| P1975 Platform | S | S | S | S | S | 33,9 |
| P2432 Platform | S | S | S | S | S | 28,4 |
| P2927 Platform | S | A | S | S | S | 33,9 |

Concern Acceptable Strength

- Pioneer conducts silage trials annually to compare cultivars with the already known cultivars from the Pioneer package.
- All the cultivars tested in the above table showed good silage characteristics, however, how each one will be applied will differ, like the needs of the farmer or producer differs.
- Plant population plays a big role in the bulk ability of each cultivar, higher plant populations from the trials do not always produce higher yields.
- Speak to your Pioneer agronomist in the area to make sure that the selected cultivar is planted at the right plant population.

Note: For more information on the agronomical qualities of each hybrid, refer to the product tables in the brochure

**Terms and Conditions:**

- The beforementioned information are only for informative purposes. Contact your Pioneer sales agent for more information and recommendations regarding your specific farming practices.
- The performance of products is erratic and depends on a lot of different factors such as moisture stress, heat stress, soil type, environmental stresses as well as diseases and plagues.
- Individual results can vary.
- Recommendations in this report are made with good intentions and are based on the samples that were analyzed. No responsibility will be accepted for loss of production or otherwise, related to a possible negative aspect of any chosen hybrid, or any cultivation practices or abilities on the farm.

**Acknowledgments and collaboration**


- Data collection and analysis of the trials were done in collaboration with AgSci Unlimited Silage Consultancy, www.agsci.co.za, unlimited@agsci.co.za
- Farmers and contractors.


# CONTACT DETAILS

## HEAD OFFICE

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**EMAIL REQUESTS:** info.rsa@pioneer.com
**ADDRESS:** 272 West Avenue, Lakefield Office Park, Block A, 2nd Floor, Centurion, Gauteng

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**Emile van den Berg** | Agronomy Manager | 0828067452 | emile.vandenberg@pioneer.com

**Caria Grobler** | Marketing Manager | 0637848129 | caria.grobler@pioneer.com

### KWAZULU-NATAL/EASTERN CAPE

| AREA | AGENT | CONTACT NUMBER |
|---|---|---|
| AREA MANAGER | Jacques Minnaar | 0663052461 |
| AGRONOMIST | De Bruyn Myburgh | 0826988117 |
| BERGVILLE / WINTERTON | Bernic Botha | 0734521847 |
| BERGVILLE / WINTERTON | Eric Heinecken | 0834680619 |
| DUNDEE | Frikkie Bester | 0823234305 |
| GREYTOWN | Shaun Carroll | 0832313962 |
| PIET RETIEF | Sarel Nieuwenhuizen | 0826809198 |
| SWARTBERG / KOKSTAD | Philip Mortlock | 0824661120 |
| IXOPO / CREIGHTON / KZN MIDLANDS | Roger Mann | 0836344367 |
| UGIE / MACLEAR / ELLIOT | Craig Lindsay | 0832761202 |
| VRYHEID / PAULPIETERSBURG | AP Keeve | 0836791763 |

### MPUMALANGA

| AREA | AGENT | CONTACT NUMBER |
|---|---|---|
| AREA MANAGER | Gerhard Marais | 0828067931 |
| AGRONOMIST | Roelof le Roux | 0836270050 |
| AMERSFOORT / VOLKSRUST | De Wet van den Berg | 0837899252 |
| BETHAL | Hannes Swanepoel (Snr) | 0825559571 |
| BETHAL | Hannes Swanepoel (Jnr) (subagent) | 0721802298 |
| DELMAS | Callie de Bruin | 0824636759 |
| DELMAS / LEANDRA / OGIES | Xavier Yssel | 0832355050 |
| HENDRINA / ERMELO | Colin Odendaal | 0820618284 |
| HENDRINA / ERMELO | PR Janse van Rensburg | 0766870202 |
| HOËVELDRIF | PM Erasmus | 0823882148 |

### EASTERN FREE STATE/STANDERTON

| AREA | AGENT | CONTACT NUMBER |
|---|---|---|
| AREA MANAGER | Des Cuff | 0609572992 |
| AGRONOMIST | Pieter de Wet | 0723465037 |
| BETHLEHEM / CLARENS / PAUL ROUX | Gideon Knobel | 0836286477 |
| FICKSBURG / CLOCOLAN / TWEESPRUIT | Ryk Neethling | 0725271334 |
| FOURIESBURG / BETHLEHEM / CLARENS | Rikus de Villiers | 0832868713 |
| HARRISMITH / WARDEN | Marchand Janse van Rensburg | 0827815221 |
| HARRISMITH / WARDEN | Maré Potgieter (subagent) | 0836042608 |
| LADYBRAND / EXCELSIOR / TWEESPRUIT / CLOCOLAN | Meyer Kotze | 0829089994 |
| LADYBRAND / EXCELSIOR / TWEESPRUIT / CLOCOLAN | Erik Faure (subagent) | 0828951897 |
| MORGENZON / STANDERTON | Francois du Plessis | 0823316572 |
| SENEKAL / WINBURG / MARQUARD | Jurgens Kotze | 0834143034 |
| STEYNSRUS / ARLINGTON / LINDLEY / VENTERSBURG | Louis Koch (subagent) | 0736610452 |
| VREDE | Hennie Janzen | 0823228037 |

### MPUMALANGA/LIMPOPO

| AREA | AGENT | CONTACT NUMBER |
|---|---|---|
| AREA MANAGER | Jacobus Dürr | 0795252340 |
| AGRONOMIST | Roelof le Roux | 0836270050 |
| BRITS / THABAZIMBI | Louis Minnaar | 0838000969 |
| CAROLINA / LYDENBURG / BELFAST / STOFFBERG / MARBLE HALL | Johan de Bruto | 0768015993 |
| DELMAS / OGIES / WITBANK | Puna Maree | 0768121514 |
| HENDRINA | Morné Ferreira | 0832678866 |
| MARBLE HALL | Cornel Smit | 0796994503 |
| MIDDELBURG | Jan Wijma | 0825550014 |
| MIDDELBURG | Pieter Erasmus | 0824506705 |
| MIDDELBURG | Willandre Kotzenberg (subagent) | 0829208074 |

### CENTRAL REGION

| AREA | AGENT | CONTACT NUMBER |
|---|---|---|
| AREA MANAGER | Gert Naudé | 0764312257 |
| AGRONOMIST | Pieter de Wet | 0723465037 |
| PRODUCT AGRONOMIST - EAST | Mauritz van Heerden | 0828853962 |
| BETHLEHEM / LINDLEY/ PETRUS STEYN / REITZ / KESTEL / ARLINGTON / CLARENS | Louw Stadler | 0826148629 |
| BETHLEHEM / LINDLEY/ PETRUS STEYN / REITZ / KESTEL / ARLINGTON / CLARENS | Herman Coetzee (subagent) | 0832619756 |
| GROOTVLEI / VREDE / VILLIERS | Johan Stadler | 0827828840 |
| HEIDELBERG | Hendrik de Wet | 0825550442 |
| HEIDELBERG | Henri Marais (subagent) | 0837642404 |
| HEILBRON / ORANJEVILLE / SASOLBURG / VANDERBIJLPARK | Brenden Naudé | 0768840514 |
| KOPPIES | LK Jonker | 0827841666 |
| NIGEL / DEVON / BALFOUR | Jan Smith | 0726632004 |
| REITZ / PETRUS STEYN / BETHLEHEM / DANIELSRUS | Oosie Oosthuizen (Jnr) | 0827894309 |
| VILLIERS / MEMEL / FRANKFORT | Schabort de Jager | 0824419739 |

### NORTH WEST

| AREA | AGENT | CONTACT NUMBER |
|---|---|---|
| AREA MANAGER | Nelis Potgieter | 0712912612 |
| AGRONOMIST | Philip Fourie | 0829093262 |
| COLIGNY / LICHTENBURG / GERDAU | Charl de Wet | 0716811254 |
| DELAREYVILLE / GEYSDORP / MAREETSANE | Niel Kamffer | 0827076552 |
| LICHTENBURG / SANNIESHOF / BIESIESVLEI | Dirk van Niekerk | 0827816377 |
| OTTOSDAL | Tommie Wiersma | 0823857122 |
| SCHWEIZER-RENEKE | Gerrit van Niekerk | 0836275162 |
| VRYBURG / LOUWNA / TOSCA | Ami de Wet | 0823436467 |
| WOLMARANSSTAAD | Thys Ellis | 0722436113 |

### NORTHERN CAPE/EASTERN CAPE/WESTERN CAPE

| AREA | AGENT | CONTACT NUMBER |
|---|---|---|
| AREA MANAGER | Kallie Knox | 0674247877 |
| AGRONOMIST | AJ Steyn | 0836273788 |
| BLOEMFONTEIN / ALIWAL-NORTH / PETRUSBURG | Launa van Aswegen | 0833100108 |
| BLOEMFONTEIN / ALIWAL-NORTH / PETRUSBURG | Trevor Thompson (subagent) | 0609454922 |
| CRADOCK / COLESBERG | Gerhard Schulz | 0741760583 |
| DOUGLAS / ORANJERIVIER | Henry du Toit | 0827835593 |
| DOUGLAS / VAALRIVIER / ORANJERIVIER | Willie Botha (subagent) | 0836321900 |
| HOPETOWN / VANDERKLOOF / GARIEPDAM | Dawie Human | 0648786140 |
| JACOBSDAL / KIMBERLEY / MODDERRIVIER | Stephen Bann | 0846255367 |
| JACOBSDAL / KIMBERLEY / MODDERRIVIER / HOPETOWN | Gawie du Plessis (subagent) | 0794930552 |
| PRIESKA | Andries Etsebeth | 0794964663 |
| UPINGTON / KAKAMAS / GROBLERSHOOP | Jannes Gagiano | 0847452992 |
| WES-KAAP / TSITSIKAMMA | Rikus Schoeman | 0636911838 |
| WES-KAAP / TSITSIKAMMA | Johan Schoeman (subagent) | 0724062470 |
| WES-KAAP / TSITSIKAMMA | Nico Schoeman (subagent) | 0833817249 |

### NORTH- & WEST FREE STATE/NORTH WEST

| AREA | AGENT | CONTACT NUMBER |
|---|---|---|
| AREA MANAGER | Hennie du Plooy | 0664336418 |
| AGRONOMIST | Martin Brandt | 0823030698 |
| PRODUCT AGRONOMIST - WEST | Johan Kock | 0716814039 |
| BOTHAVILLE | Emile Gerbrands | 0835642244 |
| BOTHAVILLE | Kirstein Kok (subagent) | 0839281236 |
| BULTFONTEIN | Pieter Vermaak | 0825424394 |
| HOOPSTAD / HERTZOGVILLE | Pieter Labuschagne | 0827751935 |
| KOSTER / GROOTPAN / DERBY / MAGALIESBURG | Liaan Lotter | 0823234878 |
| KROONSTAD / WELKOM / ODENDAALSRUS | Fires Janse van Vuuren | 0828095431 |
| KROONSTAD / WELKOM / ODENDAALSRUS | Daniel Jordaan (subagent) | 0663024172 |
| PARYS / VREDEFORT | Etienne Aucamp | 0836005779 |
| POTCHEFSTROOM / FOCHVILLE / VEREENIGING | Abrie Coetzee | 0834480940 |
| POTCHEFSTROOM / FOCHVILLE / VEREENIGING | PE Coetzee (subagent) | 0731239456 |
| VENTERSDORP / CARLETONVILLE | Sias Fourie | 0825514536 |
| VILJOENSKROON / VIERFONTEIN | Hanco Steyn | 0727834845 |
| WESSELSBRON / WELKOM / ALLANRIDGE | Braam Strauss | 0825629667 |

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