
Crops
2022
PGG Wrightson Grain
PGG Wrightson Seeds
CORSON MAIZE®

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BASF offers a wide range of valuable production tools from the latest chemical and biological alternatives, to familiar formulations growers include and trust in their crop protection programmes.

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CONTENTS

Welcome

I would like to welcome you all to our first Crops event. Our plan is to make this an annual event to allow us to pass on cutting edge information that is North Island centric.

Our list of subjects that each site is dedicated to has come about as a result of discussions with growers over the past few months. Listening to growers questions and feedback is how we keep events like these relevant, so if you have any feedback please pass this onto a PGW Seeds or PGW Grain staff member.

I would also like to take this opportunity to wish you and your families a safe & happy Christmas and offer my best wishes for the looming harvest season.

Kevin Flaxman
North Island Grain Manager

Health and Safety

The event is being held on a working farm. Please take care and be aware of all potential hazards.

- Follow instructions from PGW Seeds staff
- Staff within the specified areas
- Report any hazards to PGW Seeds staff

Site specific hazards:

- Vehicles: please take when moving through the car parking area
- Trips & falls: please keep an eye out for uneven ground
- Sun: sunblock is available on site
- Electric fences: please do not touch

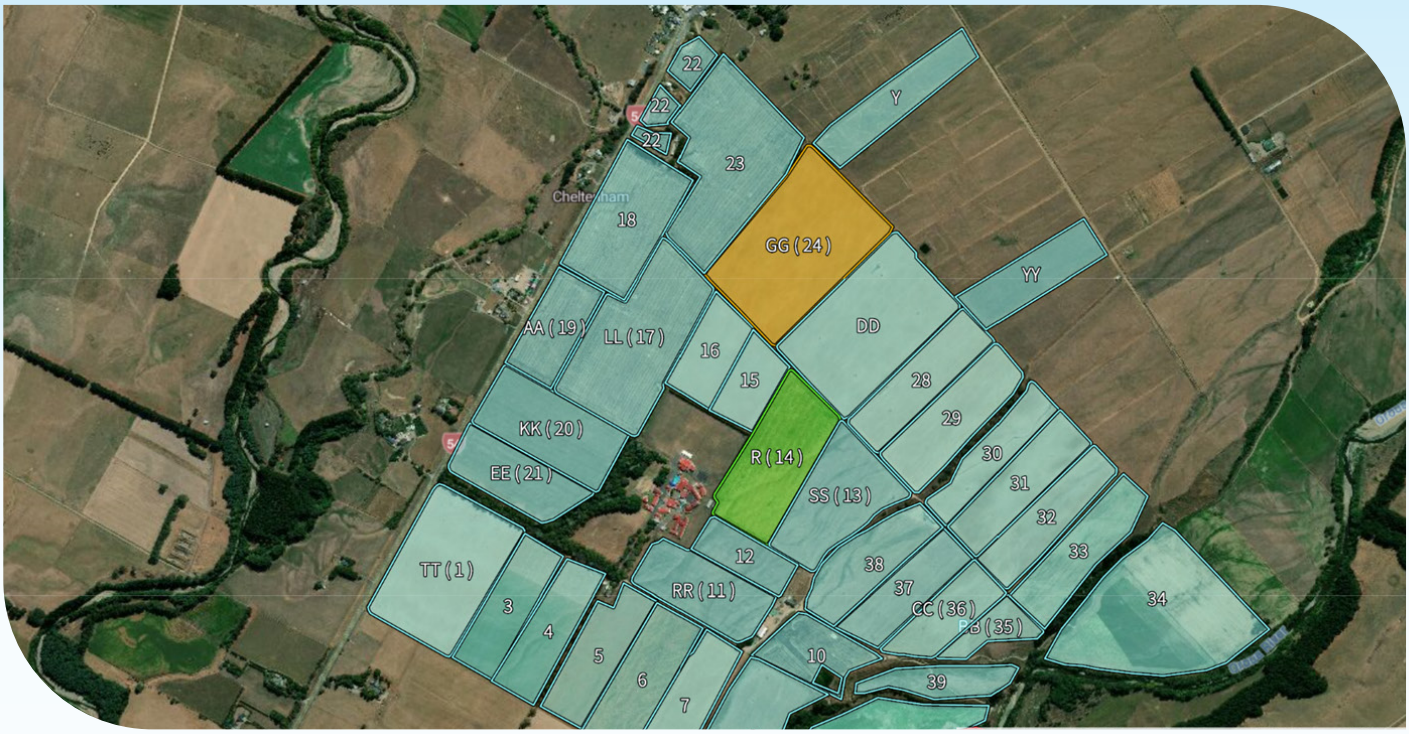
First aid: we have a qualified first aider on site and a first aid kit located in all PGW Seeds / PGW Grain branded vehicles.

Fire extinguisher: located in all PGW Seeds / PGW Grain branded vehicles.

Emergency: please call 111 and notify a PGW Seeds staff member.
Site address: 1314 Kimbolton Road, Feilding.

No smoking is permitted on site.

Crops 2022 Map & Timeline



Timeline:

1.00pm Arrival
1.15pm Welcome
1.25pm Attendees leave to head to their first site
1.30pm Presentation One
2.00pm Presentation Two
2.30pm Presentation Three
3.00pm Presentation Four
3.40pm Wrap up of day
4.00pm BBQ & refreshments

Site 1: Spring Wheat – Paddock 23
Site 2: SY Transformer – Paddock GG (24)
Site 3: Corson Maize – Paddock DD
Site 4: Garden Pea Seed – Paddock 28
Site 5: Next Generation Fungicides – Paddock 18

All presentations will overlap, and you will need to choose 4 of the 5 sites to visit over the course of the afternoon. We hope this will allow us to offer more topics relevant to a wider range of growers and also allow you to tailor the afternoon to best suit your business.

At the end of each presentation a horn will sound indicating its time to move to your next chosen site.

Spring Wheat Cultivar Development for 2023 & Beyond

Presenter: Nick Brooks, Grain Product Development Manager, PGW Grain

Planting date: 9th October 2022

Surrounding Crop: Sensas

Previous crop: Bok choy brassica seed

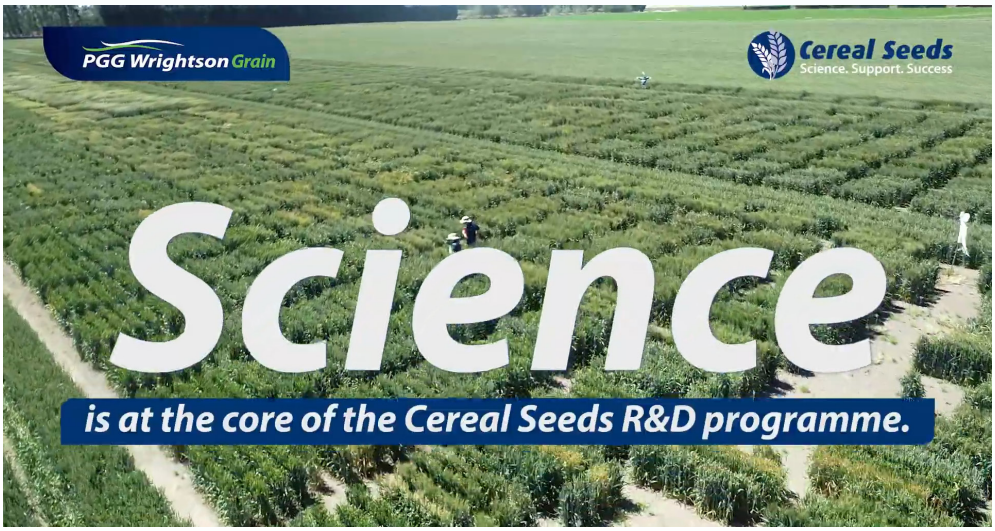
R & D Overview

PGG Wrightson Grain is one of the largest private investors in cereal research in New Zealand with a proven record in breeding and evaluation, including a comprehensive agronomy programme that optimises the management for individual cultivars delivering an overall cultivar and management package for the benefit of growers and end-users.

The in-house plant breeding is focused on milling and feed wheat with a small grain triticale breeding effort. In addition to the full breeding effort, there are extensive screening and evaluation programmes to identify cultivars for release in NZ from overseas-bred cultivars and elite breeding lines.

Both the introduced germplasm and the lines bred by PGG Wrightson Grain enter the same evaluation process progressing through two years (Y1 then Y2) of multi-site trials throughout Canterbury. Only the top performing 10-15% of lines are promoted from Y1 to Y2 and less than a handful are selected for entering into FAR-coordinated cereal performance trials (CPT).

A team of six permanent R&D staff are located at the Kimihia Research Centre at Lincoln, Canterbury with several additional seasonal staff hired to assist with harvest and post-harvest grain processing. Cereal breeding nurseries are located at Kimihia and nearby in the Lincoln area. Breeding and agronomy trials are also located on arable farms throughout the South Island.



Spring Wheat Cultivar List:

Sensas Milling Wheat

A very quick developing medium grade milling wheat, Sensas is the only true spring wheat cultivar in New Zealand. It has intermediate susceptibility to *Septoria* tritici blotch and *Fusarium* head blight with moderate resistance to leaf and stripe rust. Its rapid development makes It is well suited to later spring sowings because of its true spring character and early maturity. It also performs well from earlier sowings but should not be planted before July to avoid frost risk at flowering. It consistently produces a high-quality plump grain with good all-round grading characteristics and has high pre-harvest resistance.

Discovery Milling Wheat

In the latest spring FAR (2022 4-year mean) book, Discovery is top equal with Cochise across Canterbury sites and 2nd place in yield in the southern North Island. It shows intermediate resistance to most diseases, including *Fusarium* head blight. A strong plant growth regulator programme is recommended to reduce both lodging and shattering risk as it is a taller cultivar similar to Raffles. It produces large grain weights.

Conquest

A high protein content, premium milling cultivar, with a similar yield to cv. Reliance which puts it in the bottom yielding group in the southern North Island. Moderate resistance to stripe rust, but moderately susceptible to most other diseases. Early to intermediate maturity with high test weights and falling numbers, and low sprouting risk.

Reliance

A New Zealand bred, premium milling cultivar with yields similar to cv. Conquest. Monitor for disease, as reliance is susceptible to most diseases, with the exception of stripe rust. A moderate to stiff strawed cultivar producing high proteins with a low sprouting risk.

Raffles
— MILLING/FEED WHEAT

At 102% for its' 4-year mean in the southern North Island, Raffles is the 3rd highest yielding cultivar amongst the top group of established cultivars. It is somewhat susceptible to most diseases, with the exception of powdery mildew. Used as a gristing and feed wheat it produces a high grain weight and has low sprouting risk and a high falling number. A tall variety with intermediate maturity.

Viceroy

Viceroy is a New Zealand bred, medium grade milling wheat that is lower yielding in the southern North Island or similar to Conquest and Reliance. Viceroy shows some susceptibility to most diseases, with the exception of stripe rust. It has high sprouting resistance and produces a high test weight/high falling number grain.

Cochise

Cochise (CK411) produced exceptionally high yields in its first two years in north Island CPT trials so slightly ahead of Discovery but similar in Canterbury. It produces a large, low falling number grain due to a high late maturity alpha amylase expression rather than sprouting. In its first year of CPT2 spring trials, it shows resistance to most diseases, especially ***Septoria*** tritici blotch. A medium height variety with stiff straw and early maturity.

KMW2208 Milling Wheat

KMW2208 only has one season's trial data (2021-22) from the CPT trials in the southern North Island. In that trial it yielded the same as Discovery. It is medium grade milling wheat with some resistance to most diseases, especially powdery mildew and stripe rust. It is a medium height variety with moderate straw strength. It produces medium sized grain with high falling numbers.

SY Transformer Spring Barley: A New RGT Planet?

Presenter: Ashley Harrison, Cereal Agronomist, PGW Grain

Planting date: 28th October 2022

Previous crop: Potatoes

R & D Overview

The barley evaluation programme does not involve any breeding and is therefore not as big as the wheat activities. We bring in approximately 150 new elite breeding lines annually from four key European breeding programmes and then fast-track promising ones through the evaluation pipeline to bring to market in the future.

The CPT system, like with wheat, plays a key role in both comparing the performance of current commercial barley cultivars and bringing new cultivars to market and most barley cultivars in NZ have been through this system.
Over the past few years North Island (and South Island) growers have enjoyed considerable success, both in terms of yield and grain quality, with RGT Planet. RGT Planet has proven to be a reliable cultivar in terms of yield and consistency across different environments. As with any cv, new cv's eventually come along and supersede the current standards in the market. It's very early days, but we are excited by the release of SY Transformer.

SY Transformer is a spring barley with very high yield potential that is suitable for feed, malting and distilling (non GN cv like Laureate) end uses are unknown and currently being investigated. It has an intermediate maturity as well as good all-round disease resistance and can be planted late or on dryland but has high yield potential with irrigation and high inputs. SY Transformer is the highest yielding variety in both the FAR autumn and spring sown trials (equal to SY Silhouette) when looking at the 4-year means showing consistency across years and environments. Compared to RGT Planet in spring trials, the yield difference is 5% in the southern North Island and 6% in Canterbury.

SY Transformer

- *Highest yielding commercially available spring barley in FAR CPT trials*
- *Suited to all sowing times and conditions in both the spring and autumn*
- *Good all-round disease resistance profile especially mildew and net blotch*
- *Large grain, average test weights and very low screenings*

SY Transformer

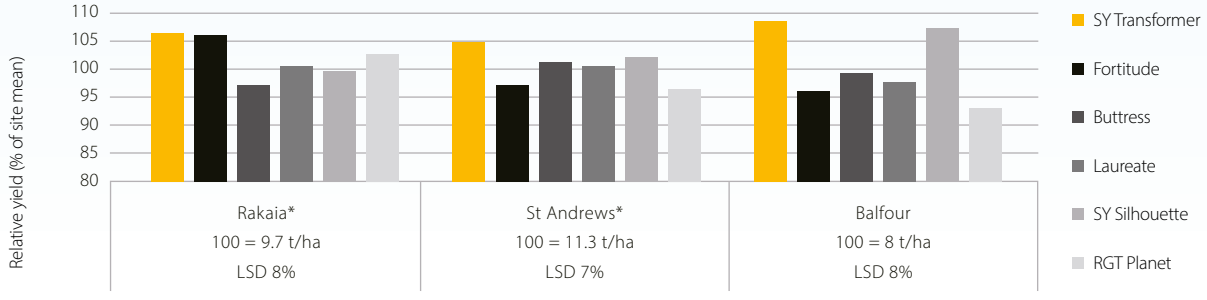
Description

From the proven Syngenta spring barley breeding programme, SY TRANSFORMER has been developed in New Zealand in conjunction with Cropmark Seeds Ltd as head licensee and PGG Wrightson Grain (PGW Grain). SY TRANSFORMER is a spring barley with very high yield potential that is suitable for feed. Malting and distilling end uses are unknown and currently being investigated. It has an intermediate maturity and can be planted late or under dryland but has high yield potential with irrigation and appropriate inputs.

Yield

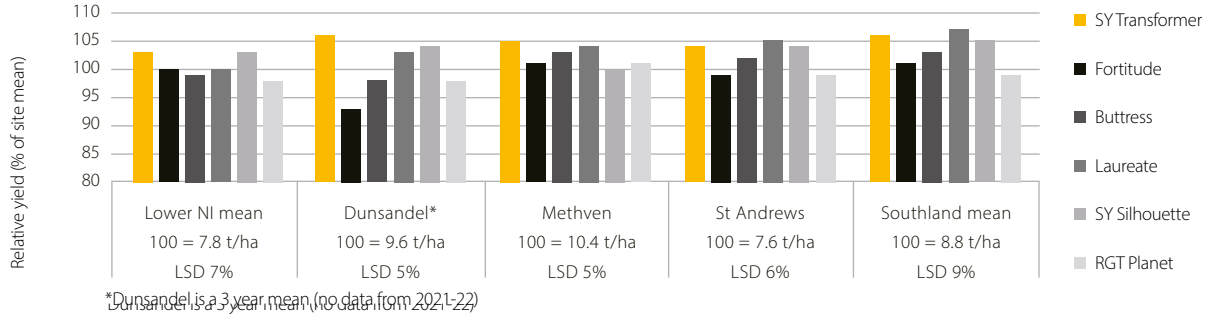
SY TRANSFORMER has high yield potential under all environments but has excelled under 'normal' conditions where it yields more than other barleys. It is the highest yielding variety in both the FAR autumn and spring sown trials when looking at the 4 year means showing consistency across years and environments.

FAR (CPT) Autumn Sown Trials (4 Year Mean)



*Rakaia and St Andrews are only 3 year means

FAR (CPT) Spring Sown Trials (4 Year Mean)



*Dunsandel is a 3 year mean (no data from 2021-22)

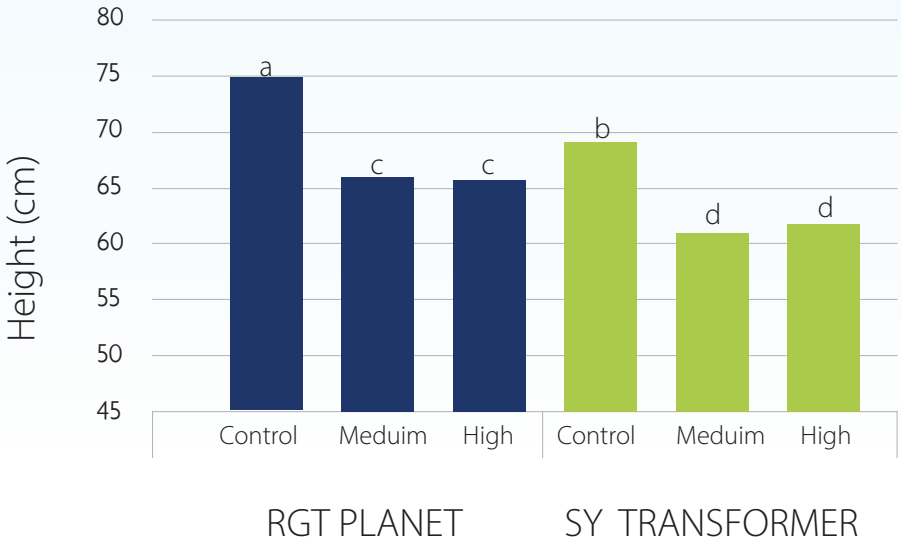
2021/22 Barley Cultivar x Plant Growth Regulator Trial

Presenter: Ashley Harrison, Cereal Agronomist, PGW Grain

Planting date: 20th May 2021
Location: Broadfield
Trial Objectives: To determine what level of PGR programme is required to prevent lodging and maintain high yields for two barley cultivars.
Cultivars: RGT Planet and SY Transformer

PGR Treatments:

Treatment	GS 30/31	GS 31/32	GS 37/49
Untreated	-	-	-
Medium Input	-	Moddus Evo 0.2 + Cycocel 1.0	Terpal 0.75
High Input	Moddus Evo 0.2	Moddus Evo 0.2 + Cycocel 1.0	Terpal 0.75



LSD: (5%): 1.8cm CV%:1.7

- Under the control, RGT Planet stood significantly higher (74.7 cm) compared to SY Transformer (68.9 cm)
- All PGR programmes significantly reduced plant height compared to the control for both cultivars
- Average height reduction from the addition of PGR's were 8.4 cm for RGT Planet and 7.4 cm for SY Transformer
- There was no significant difference between the PGR programmes for both cultivars

Garden Pea Seed: Protecting Seed Quality & Grower Returns

Presenter: Chris Sparks, Arable Representative, PGW Seeds

Planting date: 4th November
Previous crop: Maize
Pea cultivar: Douce Provence

Garden peas are a valuable food component which provide growers with a spring sown break crop option that can improve soil structure and fertility. Our pea seed is supplied to customers in many parts of the world, including Africa, North and South America, the Middle East, Pakistan, Asia, Europe, India, Australia and New Zealand. This includes customers ranging from some of the major food processing companies in the Southern Hemisphere to seed companies catering to the hand-picked pea seed market.

For all of our customers we are committed to providing high quality products from our unique pea programme.
In addition to the production of a high quality product, PGG Wrightson Seeds has the capabilities to offer the service of custom bagging, treating and branding our seed to customer specifications. This service is highly valued by many of our customers.

Key Messages

- Begin paddock preparation early with the aim to plant peas early
- Be careful with paddock selection – check records to identify any chemical residue issues
- Recommended to follow a grass crop due to high soil organic matter and the fibrous nature of soil which reduces compaction
- No pea, broad-, faba-, tic-, dry-, or processing-beans, lentils, or vetch crops or residues fed to livestock in the previous six harvest seasons
- Drilling is important – consider drill type, speed, and depth when planting / cross slotting
- Pre-emergent herbicides are the most effective weed control method and should be carefully considered
- Key diseases to control are Downy mildew and Ascochyta early and powdery mildew late
- Monitor for aphids in October and apply an insecticide if numbers exceed 2-3 per plant

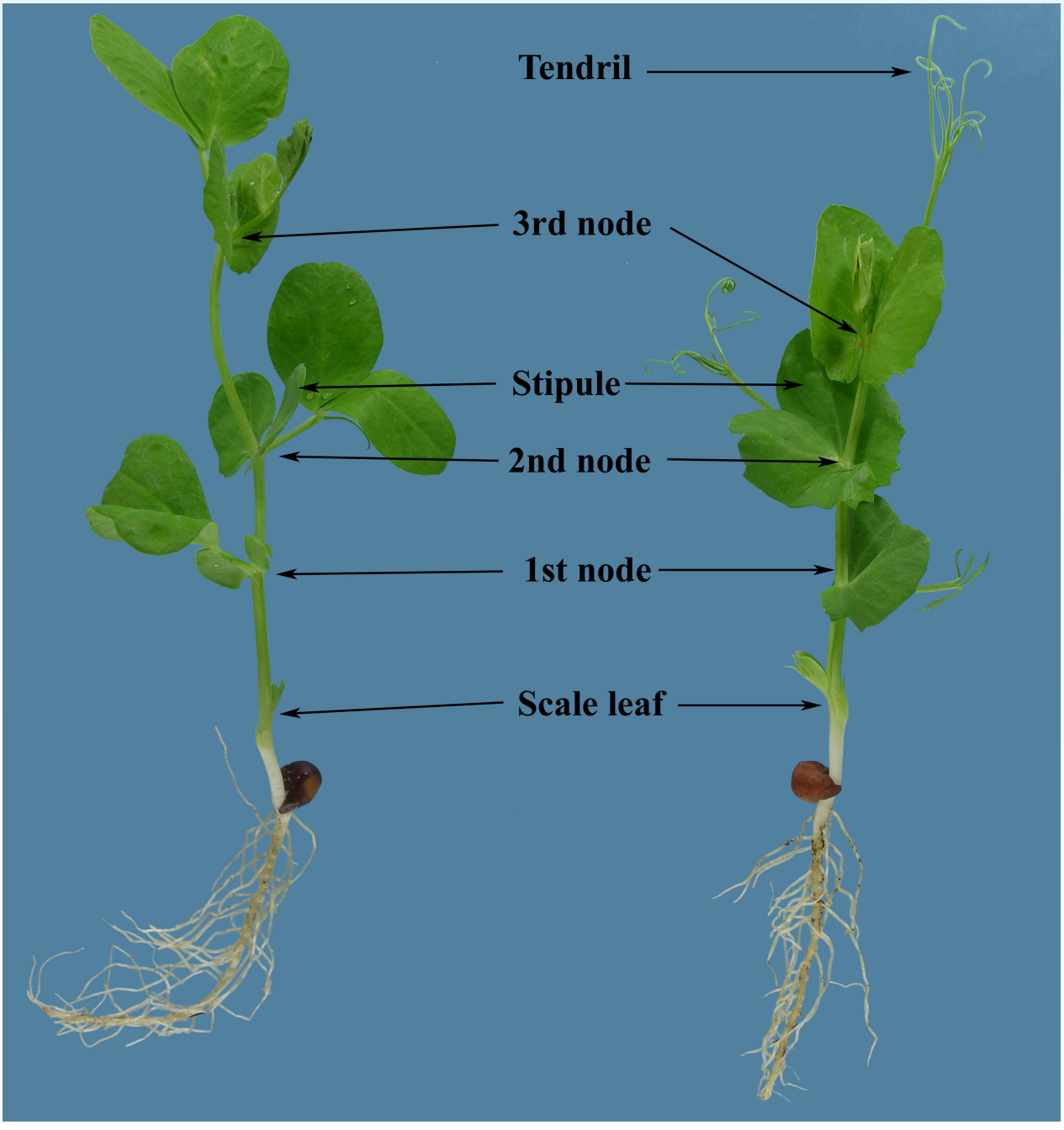
Garden Pea Seed: Protecting Seed Quality & Grower Returns

Key concepts of a high yeilding Pea Crop

Seedbed Preparation	Test soil to determine Aphanomyces level two months before sowing Safe = 0 to 49; Risky = 50 to 69; Unsafe = 70 to 100 (Common in Canterbury where there is a strong history of peas) Fertility test seven months before sowing. Correct low pH (<5.8) by applying 2.5t/ha lime six months before sowing. Optimum pH range is 6 - 6.5 N, P and K are generally not required unless Olsen P is <10 - 15, and K is <3 Develop a firm, fine, level, moist seedbed that is free of debris. Good soil structure is important for yield – keep cultivation to a minimum as peas are sensitive to compaction Trifluralin can be incorporated for weed control. Before applying any herbicides check for any residues which could impact on the next cropping rotation.
Sowing	Optimum sowing time is from mid-September to October 3 - 5cm deep (general rule of thumb; 8× size of seed), 15cm rows Calculate sowing rate to achieve 90 - 100 plants per m2 Accurate drilling depth and speed is critical – drive slowly and know the limits of the drill, check depth of all coulters. Talcum powder can be used to aid flow Roll after sowing to level the soil – this will make harvesting easier and avoid soil intake Be mindful that there is normally limited stock seed available so make sure the drill is accurately calibrated and not under-sowing. Double drilling is becoming popular as it seems to improve yields through more even establishment.
Pre-Emergence GS 0 – 9	A post sowing, pre-emergence herbicide programme is critical. There are specific options for a broad range of target weeds e.g. volunteer brassicas.
Leaf Development GS 14 – 16	Monitor the pre-emergence herbicide activity closely during the establishment of the peas and develop a follow up herbicide plan if needed. Prior to any post-emergence herbicides wait 3 days to make sure peas have a complete wax cover on leaves Be aware that any post-emergent herbicide has the potential to affect pea yields and pre-emerge herbicides are the most effective way to control a range of weeds.
Early Bud Formation GS 31 – 39	Apply a fungicide targeting Downy mildew and Ascochyta.
Full Flower GS 61 – 69	Apply a second fungicide targeting Downy mildew and powdery mildew.
Pre-Harvest GS 81 – 89	Diquat can be used to desiccate peas if a crop is weedy or ripening is uneven – make sure the crop has reached seed maturity.
Harvest GS90+	Avoid harvest delays -seed needs to be harvested as soon as it reaches maturation (14 - 16% moisture). Seed can deteriorate rapidly after maturation, especially with high temperatures and excess moisture. Harvest using a relatively low drum speed and wide concave setting to avoid splitting peas. Avoid soil in the sample as it causes issues at intake.
Drying and Storage	If harvest moisture is above 20% do not exceed 32°C when drying or 37°C when harvest moisture is 14-17% Peas need to be at 12 - 14% moisture for safe storage. Avoid screw augers when handling peas.

Garden Pea Seed: Protecting Seed Quality & Grower Returns

Garden Pea Development

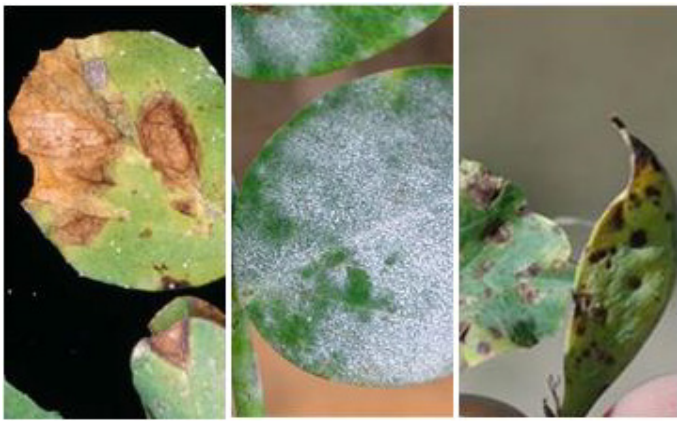


Maximising Pea Yields with Proven AMISTAR® Technology

Broad spectrum disease control

AMISTAR provides reliable control of three important diseases in peas:

- Downy mildew
- Powdery mildew
- Ascochyta



Downy mildew | Powdery mildew | Ascochyta

Superior systemic protection

AMISTAR is a strobilurin fungicide with systemic, translaminar, protectant and antisporulant properties. AMISTAR is best used in peas as a preventative treatment at key timings (5th node to 1st pod formation, and pre-flowering).

In addition to providing excellent disease control in peas, AMISTAR can also enhance green leaf retention, which can lead to further yield and quality improvements.

The Proven AMISTAR Technology advantage

AMISTAR offers a broader spectrum of disease control compared to other fungicide options for peas.

Product	Downy mildew	Powdery mildew	Ascochyta
Triazoles	✗	✓	✗
Copper	✓	✗	✓
AMISTAR	✓	✓	✓

Ascochyta in peas

- Ascochyta can overwinter in seed, soil and infected crop residue.
- The disease attacks all parts of the foliage.
- Moisture is essential for the development and spread of the disease.
- Ascochyta can be aggressive after rainfall.
- Starts as small lesions on the lower leaves/stem.
- Can be spread quickly by wind or water.
- Potential to reduce crop yield and quality.

Field trial on Ascochyta - 2015 season

Syngenta conducted a field pea trial in Central Hawkes Bay in 2015, comparing 3 x 3 ha treatments as follows.

Trial treatments

Plot	Treatment
1	Bladex® (1.2 L/ha) + MCPB (2.5 L/ha) @ 6th node.
2	AMISTAR + Bladex® (1.2 L/ha) + MCPB (2.5 L/ha) @ 6th node.
3	AMISTAR + Bladex® (1.2 L/ha) + MCPB (2.5 L/ha) applied @ 6th node; followed by a second AMISTAR (500 mL/ha) @ pre-flower.

Trial results

Plot	Yield (t/ha)	+/- (t/ha)	+/- (%)
1	8.9	-	-
2	10.0	+1.1	+12.4%
3	9.4	+0.5	+5.6%

Positive margin over chemical cost

With the cost of AMISTAR @ $35.00/ha and an extra 1.1 t/ha of peas worth $418.00 (@ $380.00/t), the positive margin over chemical cost of applying AMISTAR at 6th node in this field trial (i.e. Plot 2) is $383.00/ha.

Trial site – Central Hawkes Bay

Amistar®

syngenta

Directions for using AMISTAR on peas

Disease	Rate	Critical Comments
Ascochyta, Downy mildew, Powdery mildew	500 mL/ha of AMISTAR SC	The first application should be made as a protective spray at 5th node to 1st pod formation.
		A second application 14 - 21 days later is required if disease pressure remains high.
		Apply in a minimum of 200 litres of water/ha for a crop in full canopy and ensure uniform coverage.
		The addition of a surfactant at recommended label rates will assist crop coverage and spray distribution.
		The use of angled Syngenta Potato nozzles alternating forwards and backwards will improve spray coverage.
		Before applying AMISTAR, ensure the crop is free from any stress caused by environmental or agronomic factors.
		Application to established Ascochyta, Downy mildew or Powdery mildew will not give reliable control.

Withholding periods – AMISTAR
Garden/process peas without pods - 14 days
Dry seed/feed peas - 35 days
Pea hay silage - 14 days
Pack sizes - AMISTAR comes in 5 litre and 20 litre packs (enough for 10 or 40 ha's).

Resistance management
AMISTAR fungicide contains a member of the strobilurin, or Quinone outside Inhibitors (QoI), group of fungicides. AMISTAR is a Group 11 fungicide. Resistance to this fungicide could develop from repeated use. To minimise this risk use strictly in accordance with label instructions and resistance management strategies. Since the occurrence of resistant fungi is difficult to detect prior to use, Syngenta Crop Protection Ltd accepts no liability for any losses that may result from the failure of AMISTAR to control resistant fungi. Consult your local supplier, consultant, a Syngenta representative or New Zealand Plant Protection Society (Inc), www.resistance.nzpps.org for alternate modes of action and the details of resistance management strategies for the crops listed on the label.
For more information please call the Syngenta Technical Advice Line on 0800 333 336 or visit our website at www.syngenta.co.nz

Positioning Hybrids To Yield In A Changing Climate

Presenter: Mike Turner, Research Agronomist, Corson Maize

Previous crop: Maize
Surrounding hybrid: PAC 200 (Grain CRM 100)

With the ever-changing seasons, there are a few key points to consider when planning the establishment of your next maize crop. Understanding the environment in which you are planting the crop is the first step towards this, but there are others to consider:

Hybrid Selection: Choosing hybrids that can adapt to the challenges within your environment. Whether it be disease or drought pressure, exposure, field fertility or altitude, there are hybrids available that can function better with these challenges. The same hybrid that works well in the fields at the front of your block may not be suitable for the fields at the back.

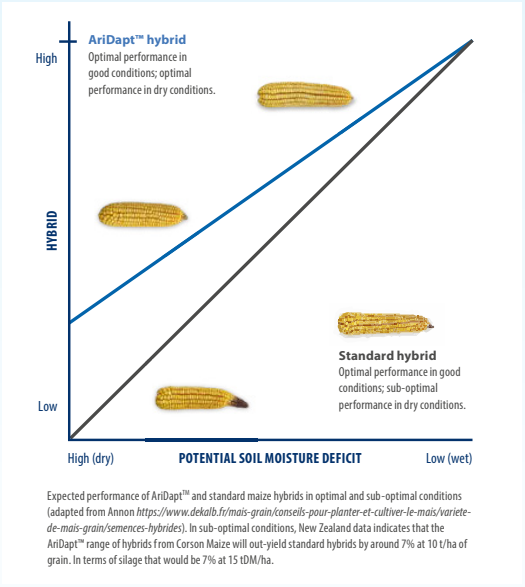
Hybrid Flex: Flex – "the ability of a hybrid to adapt to a high or low planting population". Having a hybrid that has a high flex ability allows the flexibility to plant your crop at a low population, which help mitigate the risk of moisture stress, but with the knowledge that if there is sufficient moisture present it has the ability to increase cob and kernel size to produce good yields.

Population: Understanding how hybrids respond to different populations/environmental pressures and adjusting your population as required. In areas of known negative pressures, lowering plant populations helps build resilience into the crop, and helping to protect yield potential.

NOTES:

Positioning Hybrids To Yield In A Changing Climate

There are only a few management options that maize growers can use to achieve this resilience, this starts with selecting a hybrid with the right genetics. The AriDapt™ range of hybrids from Corson Maize utilises advanced germplasm developed in the semi-arid regions of southern Europe.
With climate variability the new normal, farmers and growers are faced with the challenge of having to build resilience into their systems.



Expected performance of AriDapt™ and standard maize hybrids in optimal and sub-optimal conditions (adapted from Annon *https://www.dekalb.fr/mais-grain/conseils-pour-planter-et-cultiver-le-mais/variete-de-mais-grain/semences-hybrides*). In sub-optimal conditions, New Zealand data indicates that the AriDapt™ range of hybrids from Corson Maize will out-yield standard hybrids by around 7% at 10 t/ha of grain. In terms of silage that would be 7% at 15 tDM/ha.

BENEFITS

The AriDapt™ maize hybrids from Corson Maize will provide growers with higher and more consistent grain and dry matter yields in a wider range of conditions compared with other conventional hybrids. PAC 249, PAC119 PAC 314 and PAC 430 are the Corson Maize hybrids that have the AriDapt™ technology available this season. All of these hybrids have demonstrated themselves to perform consistently well in some of the best and worst conditions in their respective North Island regions. Build resilience into your system by growing AriDapt™ maize hybrids from Corson Maize.

HOW DOES ARIDAPT WORK?

The AriDapt™ range of hybrids in the Corson Maize portfolio are the same hybrids that have proven themselves superior to other hybrids in the hot, dry, unirrigated fields of southern Europe, whilst remaining extremely competitive in higher rainfall areas and irrigated fields. Developed during the early-mid 2000's following an amalgamation of two of the world's leading maize breeding companies Dekalb and Cargills. AriDapt™ maize hybrids are produced from elite, inbred lines that have been repeatedly crossed and inbred for specific characteristics that enable their offspring to perform exceptionally well in hot, dry conditions, namely:

- Strong deep roots with resistance to dry rot
- Early silking and extended flowering period
- Superior heat and drought tolerance in the form of kernel set and staygreen
- Plant death
- High water-use efficiency
- Well balanced canopies, not excessively leafy
- Strong thick stalks and low ear placement
- Early silking and extended flowering period
- Optimal husk length to ensure timely silk emergence
- Excellent green leaf-area retention (staygreen)
- High grain harvest-index and total biomass (dry matter yield)

This elite gene profile on its own isn't enough. Hybrids have to prove themselves statistically superior in hot, dry, arid conditions but also perform equally well in more optimal and irrigated conditions. Hybrids that have strong agronomy but do not show the required level of yield stability across environments are not branded AriDapt™.

Arietta®
Herbicide

Continuing to fit your schedule for weed control

- ✓ Flexible application window (depending on weed size)
- ✓ Flexible mixing partner – can be mixed with a range of other herbicides
- ✓ Can control difficult grass weeds such as yellow bristle grass and broom corn millet
- ✓ Short replant intervals

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ALWAYS READ AND FOLLOW LABEL DIRECTIONS.

ACVM Registration No.P8825. 212937 11.2022

Next Generation SDHI Fungicides

Presenter: Grant Hagerty, Technical Development Manager, BASF

Planting date: 9th October 2022
Surrounding Crop: Sensas
Previous crop: Ryegrass

Resistance is fertile

Only 3 key fungicide mode of action groups make up the backbone of the cereal disease control fungicide programme. There are products outside the big 3 but in the long term we are going to remain reliant on triazoles (Group 3 - DMI), strobilurins (Group 11 - QoI) and SDHI's (Group 7 - SDHI) in the field. Two key products outside that are Phoenix® (folpet) (Group M4) and Questar® (fenpicoxamid) (Group 21). All of these are potentially at risk from resistance within fungal populations.

There are issues with Group 3, Group 11 and Group 7 products when used against Ramularia leaf spot of barley in NZ. Even some triazoles now struggle. Similarly Group 3 and Group 11 are compromised to ineffective against Speckle leaf blotch (SLB) of wheat. Now we also have problems with Net blotch in the Canterbury region.

It's a scary place when of all the registered products from the big 3 groups are compromised by resistance in some way or another.

What can we do?

- Grow resistant cultivars spraying with a light fungicide programme from the onset
- Use disease specific strategies
- Target the disease with the best chemistry
- Rotate the chemistry
- Tank mix within the rotations
- Be wary of 2nd year crops
- Calibrated application equipment

The biggest driver is the exposure time, i.e. how often is it used. The more times a fungicide is applied the greater the resistance risk. Limit use to strategic timings.

Rates are a contentious issue; use the dose that delivers the best control, but some say high doses enhance resistance development. We suggest good fungicide programmes from the beginning of the crop cycle mean no product gets put under extreme pressure. Waiting for a T2/Flag high powered application to clean up the crop is not the best use of new chemistry. Products get put under pressure if they are used to eradicate established infection coming up from the crop base. A clean crop needing protectant sprays coming up to flag and ear emergence applications makes controlling disease into grain fill much easier.

It is established rotating between mode of action groups is sensible resistance management. Should we rotate within these groups as well? The groups and their members have different resistance profiles dependant with the type of resistance, the disease, the mutations involved and the molecules themselves.

For strobilurins resistance it is like a light was turned on/off – instant and complete darkness, regardless of the type of lightbulb (aka fungicide). In most cases all products are affected similarly.

With triazoles it's like the light dimmer has gradually been turned down, performance is compromised sometimes imperceptibly if tank mixed or co-formulated with a solid product. When the light bulb (fungicide) is changed and turned back up its bright again – this is a shifting sensitivity that happens over time. Among triazoles it is well documented there are significant differences from ai to ai against SLB. Propiconazole (Tilt®) and tebuconazole (Folicur®) and more recently epoxiconazole (Opus®) and prothioconazole (Proline®) are less and less effective. Mostly the effect is a loss of eradicant activity and reduced length of protection. The same effect is seen in Ramularia and Net blotch.

The situation for SDHI's is complex with more of a combination of switch's and dimmers and levels of fitness after mutations occur. Some diseases are rendered almost completely immune (Net blotch) while others (Ramularia) have remnants of efficacy, which is important in tank mixing. SDHI's loose more efficacy, earlier, than triazoles when resistance manifests.
Looking at the key pathogens and the best products to use there are some winners and losers once resistance is factored in.

Triazoles like epoxiconazole and prothioconazole against SLB leaf blotch are compromised with mainly protectant activity remaining. The pick of the bunch is the new mefentrifluconazole compound, Revylution®. Canterbury trials show a drop off in performance against Ramularia for prothioconazole – epoxiconazole was never active. The best choice is a mefentrifluconazole based product. The recent Net blotch outbreaks in Methven are harder to control with prothioconazole, but it remains the strongest triazole. Rusts and Scald control remains solid.

Strobilurins are well known to be ineffective against Powdery mildew, SLB and Ramularia thanks to the G143A mutation. Some strains of Net blotch in Methven are not well controlled by azoxystrobin (Amistar®) but are by pyraclostrobin (Comet®) – this suggests the presence of the F129L mutation. For that site pyraclostrobin was the strongest compared to picoxystrobin and azoxystrobin. Scald, never the strobilurins strongest suite, shows no signs of resistance. Rusts are well controlled by strobilurins.
The SDHI's have reported resistance issues in barley against Ramularia (local data), Net blotch (international data) and wheat SLB (international data). It is not all bad news as the field isolates are often not as fit as the wild type meaning they do not compete well and do not cause yield losses. Scald and rusts have no indications of local resistance. It would be fair to say this is a warning though that the SDHI's are not going to last forever and strict management of use must be maintained.

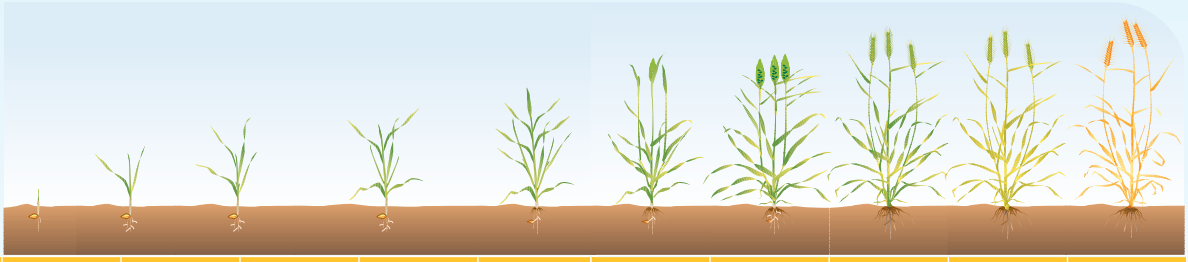
Finally, a note on folpet and fenpicoxamid. Folpet, a multisite protectant, and fenpicoximid have places for use as components in a resistance manage programme, where the product has label claims for that disease, otherwise it does not contribute to resistance management. This is the same for any proposed resistance management combination. It only works if both partners work in their own right.

A spring barley Net blotch/scald/rust/Ramularia programme could be …

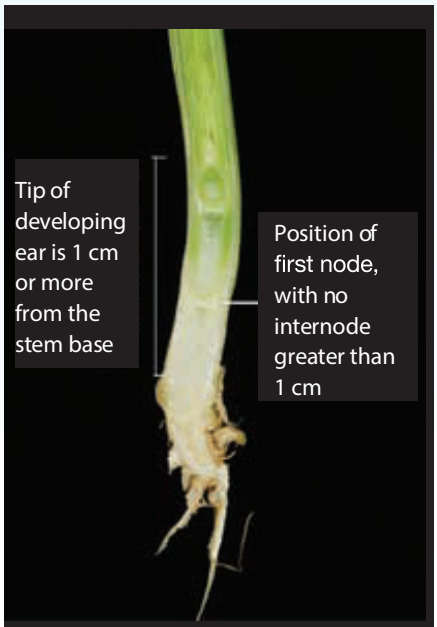
- Systiva (G7) seed treatment Scald and rust
- T1 GS 32 - Comet (G11) /Proline® (G3) /Phoenix (GM4) - Net blotch, rusts, scald, Ramularia
- T2 GS 49 - Revystar® (G3+7) /Comet (G11) - Ramularia, rusts, net blotch, scald

In summary we must look at our resistance risks very hard, there are few new innovations that can fill the gap especially in barley with Ramularia and Net blotch looming as threats. Use the programmes published, read the labels, even visit the resistance management web site (https://resistance.nzpps.org/index.php), look at what is happening in the crop, refer to historical spray dairy's for optimum early timings, and seek advice.

Cereal Growth Stages

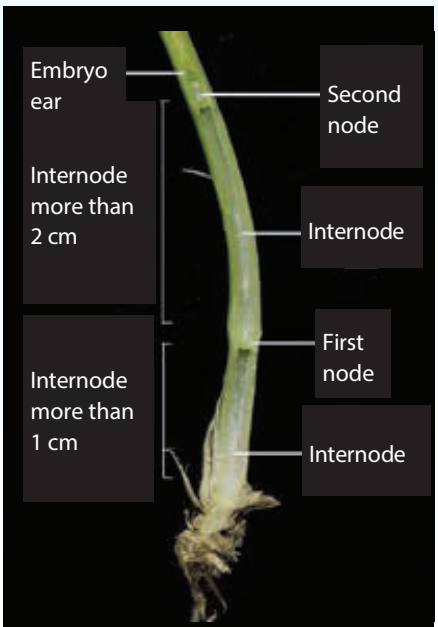


Zadoks Growth Stage	GS 00 - 09	GS10 - 19	GS20 - 29	GS30 - 39	GS40 - 49	GS 50 - 59	GS60 - 69	GS70 - 79	GS80 - 89	GS90 - 99
Development phase	Germination	Seedling growth	Tillering	Stem elongation	Booting	Ear emergence	Flowering	Milk Development (grain fill period)	Dough Development (grain fill period)	Ripening



GS30 - Main stem with embryo ear at 1 cm

GS31 - 2nd node is less than 2 cm from 1st node

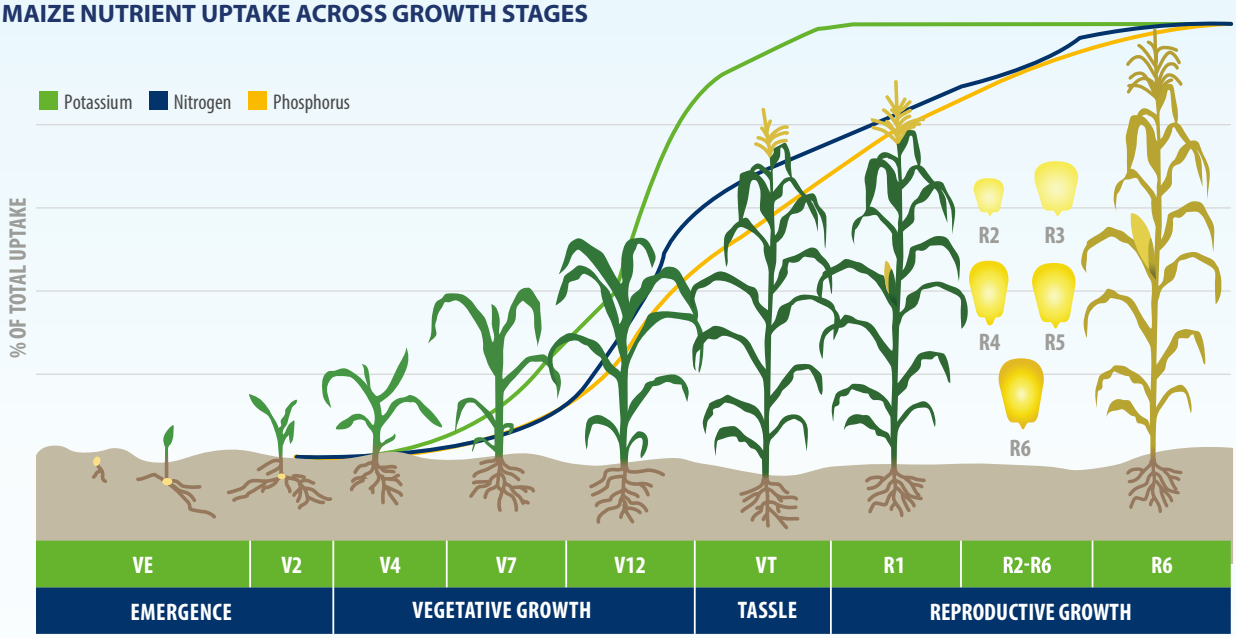


GS32 - 2nd node formation

Maize Growth Stages

CORSON MAIZE®

MAIZE NUTRIENT UPTAKE ACROSS GROWTH STAGES



Thank You

Thank You

Thanks to John & Jenni Ridd for hosting our Crops 202 sites. Thanks to Kevin Sinclair from Plant & Food Research for assistance with the spring wheat trial.

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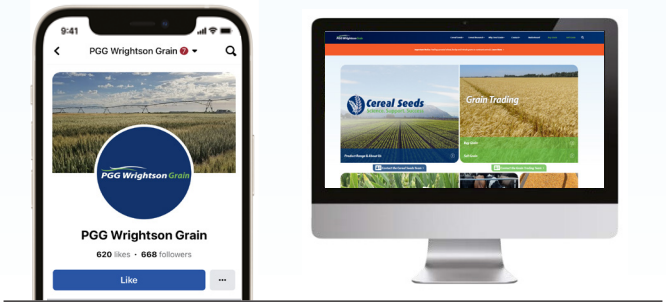

NOTES:


PGG Wrightson Grain
PGG Wrightson Seeds
CORSON MAIZE®