Distributors' Trials Guide

Get the most from displaying trials for farmers, open days, and learn about new varieties.

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SEEDING
THE FUTURE
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KWS

Introduction

Welcome – this guide is designed to help get the most from running and displaying trials for farmers, open days, and learn about new varieties.

With the increasing number and segmentation of available varieties, the role of local trials, alongside the national official trials system, is of increasing relevance.

We hope you find this guide useful!

For further information don't hesitate to contact any member of the KWS team.

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KWS and maize

KWS supports a full range of high quality maize hybrids for the UK market in both official and private trials. Our portfolio offers the choice of Ultra Early through to Maincrop Forage and Grain maize, plus dedicated hybrids for Biogas.

KWS also runs one of the largest independent series of maize trials in the UK. This is managed by Hunt Agri Services Ltd who co-ordinate in excess of 4,500 replicated plots each year.

Our European breeding programme takes new lines and test hybrids which are then screened for several years, to achieve high yielding, early maturing varieties with a high degree of stability.

Our key selection traits

- Early vigour
- Stress/cold tolerance
- Overall stability
- Maturity
- Energy contents (starch and cell wall digestibility)
- Total dry matter yield

Seed supply

Due to high demand and limited quantities available (often very limited when looking at brand new candidates) early ordering and reservation of seed is recommended.

Seed is most often supplied as smaller 12,500 kernel units, or can also be supplied as 50,000 kernel units on a limited basis.

To order seed please email your request to a member of the maize team.

Tips for ordering

- Order by mid-February to ensure sufficient stock is available
- Remember to include all the hybrids you would like to test
- Confirmed quantity of seed (either in units / number of kernels / weight in Kg)
- A full address inc. a contact number for delivery

Trial seed orders are usually dispatched by early March each season.

Site selection

The 'ideal' trial site is influenced by the purpose of the trial, and what results or effects are trying to be gleaned from it, examples of these can include:

Marginal site, higher altitude, heavier soil, low heat unit average

- Environment > selection pressure for early maturity (starch and dry matter content)
- Disease > Eyespot Aureobasidium zeae

Favourable site, moderate altitude, medium soil, moderate heat unit average

- Environment > selection pressure for yield and quality (starch and ME [MJ/Kg])
- Disease > Eyespot Aureobasidium zeae , Maize rust Puccinia sorghi

Biogas, high potential site, low altitude, sandy soil, high heat unit average

- Environment > selection pressure for yield, drought tolerance, stay green
- Disease > Helminthsporium helminthosporium turcicum

Plastic, all sites, medium to heavy soil, low to moderate heat unit average

- Environment > selection pressure for film emergence, stay green, yield stability and quality
- Disease > Eyespot Aureobasidium zeae

Grain maize (crimped or dried), sheltered site, sandy to medium soil, high heat unit average

- Environment > selection pressure for grain yield, dry down, lodging and brackling resistance
- Disease > Helminthsporium helminthosporium turcicum, Fusarium stalk rot or ear spp.

KWS' Online Heat Unit Service

- Quickly gauge your sites suitability enter the farm postcode of your site. You can use the tool throughout the season to check on the crop development and likely harvest window.

Many factors come into play when designing a trial, with site selection being paramount.

Site and location effects have an overriding effect on all aspects of a trial, some of these are highlighted below:

- Expected performance relative to previous experience of known varieties
- Statistical error and degree of uniformity – often expressed as the CV (coefficient of variation)
- Visual impression
- Selection pressure for a given trait or traits

Variety inclusion

At KWS we often adopt the policy of testing an identical set of varieties across all sites.

This allows an increased knowledge about the adaptability of new candidates in all environments.

And also ensures the best fit of expected performance, and can be checked against known control varieties when they may be too early or too late for a site.

Specific strip tests for a set end use, (eg; biogas or grain maize) may only focus on a smaller set of varieties, within a specific maturity range.

Please consult the maize team if you need further advice.

Appropriate FAO range

Including both late (FAO 260 – 240) and ultra-early (FAO 150 – 160) hybrids within the same trial, may necessitate splitting harvesting to avoid compromising the yield, dry matter or quality ranges that could otherwise be expected.

Control varieties

We strongly recommend including a minimum of 2 control varieties' which act as checks within any trial.

Trial design
(strip, replicated, field demo)

A summary table of different crop trial designs is shown below:

Trial Type	Variety No.*	Considerations
Demo Strip	10	▪ Visual assessment only ▪ Should be drilled in maturity order ▪ Lacks focus if too many varieties are planted ▪ Ensure sufficient plot length
Seed Rate	10	▪ Ideal for lighter soils / lower rainfall areas to demonstrate effects of excess plant density ▪ Plot thinning is necessary by 2 – 4 leaf stage
Replicated	30	▪ Ideal for screening a large number of varieties ▪ Must be managed and harvested within protocol ▪ Requires several visits through the season
Grain	20	▪ Requires existing grain harvesting capability ▪ Weed control is more critical due to earlier drilling ▪ Assessment of grain moisture and careful sampling ▪ Site and season awareness of European Corn Borer (ECB) and greater potential for leaf diseases
Under Plastic	20	▪ Drilling time is critical, plots drilled too early will induce excess crop stress, and premature tasselling ▪ Ensure adequate soil moisture at drilling for optimum pre-emergence based herbicide efficacy ▪ Ensure an appropriate maturity range for the site
Variety Wheel	6	▪ Ideal to show a lot of varieties in a compact area ▪ Sufficiently wide to allow for any edge effects ▪ Can easily combine a very wide range of maturities in one area

*Recommended minimum

Drilling

Adequate soil temperature is critical for successful maize cultivation. Three factors are needed for successful germination:

- **Water** – the soil surrounding the seed has to be adequately moist to initiate germination
- **Warm temperatures** – a minimum of 8°C and rising for 3-4 consecutive days
- **Oxygen** – the soil is not compacted

Note: For heavier soils, it is advisable to wait for temperatures to rise to 12 °C to encourage faster emergence.

For the purposes of trials establishment, it is unwise to impose cold stress in any attempt to measure perceived differences in varietal cold tolerance. Whilst all hybrids exhibit different degrees of early vigour, care should be taken not to risk poor trial establishment in any attempt to drill prematurely.

KWS now provides a live 'free to access' online service for all farmers and advisors, to assess soil temperatures, pre, during and after drilling.

Data shows the soil temperature at 10 cm, for the 5 closest weather stations to your farm.

Surface temperature is also shown, to highlight the risk of frost.

Row spacing

Row spacing differs from plant density but can sometimes be confused with it.

Trials to establish the effects of plant density are conducted at a standard row width. Typically the trial is planted at around 120,000 seeds / ha, and then thinned to the desired densities once all plants have reached the 2-3 leaf stage. Typical yield responses are difficult to measure when harvested for silage, so the majority of trials using seed density are combined, where an exact grain yield can be recorded.

Row spacing trials should be conducted at a uniform seed rate, where only the seed deposition and spatial area is altered. Typical row spacing depends on the available machinery and are as follows:

Standard

75 cm (30") – the majority of precision drills and ca. 90% of commercial crops today

Close Row

55 / 60 cm (21 / 23") – popular for larger growers where the ability to tramline is useful

'Compact' Close Row

37.5 / 45 cm (15 / 18") – are considered very close and demand a long deposition distance that not all drills can achieve. Not common in commercial crops.

Twin Row

A relatively new technique where two rows are planted within 10cm (4"), and offset with a coulter gap of either 75cm (30") or 90cm (36") to the neighbouring coulter. More common in the USA but now beginning to appear to Europe.

Strip Till Concept

The concept of strip tilling has grown in line with the increase in biogas cropping. To fully utilise the digestate for the feedstock crop, the idea of precision placement at the root zone was developed. Strip till machines generally operate on standard 75cm (30") rows, and their coulters are also able to operate at a greater seeding depth if required.

Varietal tolerance to row widths

Each breeder builds up experience of a variety once it has finished trials and becomes commercially available. A picture of the tolerance to tighter row width can be built up, and then a recommendation made based on this experience.

As the popularity of differing row widths has increased, so too has the demand for a recommendation on row width tolerance. KWS is able to recommend which hybrids are suitable for closer rows, and also able to withstand higher plant densities.

Plant nutrition for trials

Plant nutrient again depends on the design and purpose of the trial. KWS operates two types of trials systems. First a low-input regime, where new lines and test hybrids are trialled in the absence of any fertiliser. This technique allows the expression of yield on a purely genetic level.

For commercial practice, the majority of trials mirror standard fertiliser use. Given the range of maturity and yield potential within any trial it is considered practicable to use a uniform treatment and rate of all major nutrients.

Common crop input trials can also include

- Starter fertiliser
- Herbicide
- Fungicide
- Insecticide (foliar or seed treatment based)
- Seed treatment (separate)
- Digestate / Organic fertiliser
- Macro nutrient
- Micro nutrient

Nutrient specific trials should use one variety or at least the same set of varieties to gain a result based on a known hybrid type. (For example, a short season 'ultra-early' hybrid may give a clear yield response within increased [N] nitrogen application)

Common fertiliser rates should reflect crop requirement and soil index of the trial site. For UK conditions this can follow the following range.

Site Classification	Average Heat Units	Max expected Yield (fresh tonnes/ha)	Crop Requirement		
			N*	P	K
Marginal	2100 +	40	120	70	210
Intermediate	2400 +	50	130	75	230
Favourable	2600 +	60	140	80	250

Display and Open days

Field demonstrations for trials should focus on keeping the event focussed and running to time. Here are a few tips:

- Keep the event focussed with fewer varieties
- Ensure a walkthrough of varieties is based on end use or maturity order
- Consider event catering located near to the field
- Invitations should not be sent too far in advance of the event
- Variety boards should clearly label the name and where desired, the designated use / maturity
- Marketing literature should be available close to hand

A well-attended demo day in mid September – focus on fewer topics and a moderate pace for larger groups.

Harvesting protocols and sample analysis

Harvesting trials at the right time is perhaps the key factor in determining data is of sufficient quality and generates results that are representative of all varieties within the trial.

By increasing the range of maturities from 'ultra-early' right down to 'very late' within a single trial, the need to split harvesting becomes more critical.

Where this is not possible, it creates a compromise between the timeliness of harvest, and the eventual picture of results. A 'snapshot' of dry matter and yield can be generated that sometimes means varieties at both extremes can suffer from reduced performance to a lesser or greater degree.

Just like a commercial crop there are numerous effects from harvesting a trial either too early or too late:

Effects of harvesting too early

- Higher 'bottom end' yield – early varieties tend to express maximum potential
- Lower 'top end' yield – the yield curve plateau's as later varieties fail to mature
- DM% differences tend to truncate across all maturities
- Dilute ME content (MJ/Kg) and Starch (%)
- Increased ADF (%) [Acid detergent fibre] owing to more acidic silage
- High sugar content (%)

Effects of late harvesting

- Higher 'top end' yield – later varieties tend to express maximum potential
- Lower 'bottom end' yield – early varieties become overripe and dry down rapidly
- DM% differences tend to widen across all maturities
- Very high ME content (MJ/Kg) and Starch (%)
- Increased NDF (%) [Neutral detergent fibre] owing to more alkaline silage
- Very low sugar content (%)

Procedures for silage analysis sampling

- Modern silage analysis uses an NIRS (infra-red near scanning) and generates results within seconds
- Where this is not available, individual samples must be taken from each plot
- Ensure this sample is labelled and then frozen in storage, prior to being sent for lab analysis

Results and data presentation

The presentation of trial results does not carry any one standard, and trial operators are entirely free to decide how to present data.

The most common methods are either as tables, or graphs. Graphs are designed to give an instant view of the data contained in a background table. Tables carry the exact values and allow closer interrogation of data.

Graph results – advantages and disadvantages

- Shows a trend in the data (e.g. DM% v DM Yield)
- Shows minimum/maximum and outliers
- Trend lines become flat if the trial was harvested outside of DM protocol

Table results – advantages and disadvantages

- Shows exact figures for close scrutiny between data points (e.g. Starch % v ME [MJ/Kg])
- Retains exact data points and prevents minor scale differences from exaggerating a trend
- Hard to visualize results in large data sets

CONTACTS

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