Seed sampling and testing

It is a legal requirement for seed to be officially sampled and tested before it can be certified.

Where grain is being considered for use as farm-saved seed, sampling and testing are important management tools. Tests should measure percentage germination, purity and levels of seed-borne diseases.

Grain must be sampled correctly to ensure the sample, and subsequent results, accurately represent the bulk.

Sampling

Sample grain before cleaning or drying using appropriate equipment, ideally either a single or multi-chamber stick sampler. As bunt spores contaminate equipment, it must be washed with water and detergent before sampling and between lots.

Alternatively, a trained agronomist can undertake sampling.

If seed is to be saved from a larger grain bulk, separate grain intended for sowing. Only use seed from one field to reduce variability within a seed lot. If a seed lot exceeds 30 tonnes, subdivide it into smaller lots.

Take samples from across the bulk or trailer at different depths. The number of samples required is given Table 3. Thoroughly mix all samples from a given lot in a clean bucket and then divide to create a composite sample for testing.

Lot size (tonnes)	Primary samples required
*<5	10
5	10
10	20
20–30	40

* Testing seed lots of less than 5 tonnes is unlikely to be economic as seed sampling and testing will be costly relative to savings, even if test results are below threshold.

Table 3. Number of primary samples required for given lot sizes.

Seed testing

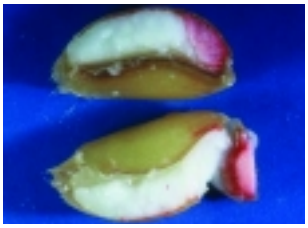
It is important to understand differences between available tests, particularly for germination and seed-borne diseases (Tables 4 and 5).

Germination

Low germination – due to disease, sprouting, drying, or mechanical damage – is a major cause of poor quality in UK seed. Testing for germination offers value for money.

A germination test involves growing seeds in a controlled environment to predict their potential to develop into plants. The test is comparatively slow, but – if time permits between harvest and sowing – is a low-cost option.

Where time is limited the tetrazolium (Tz) test is recommended. This biochemical test indicates potential germination after treatment where seedling blights are present.



Thousand Seed Weight

TSW is an aid to calculating seed rate. Test results are normally available within 24 hours.

Test	Germination	Tetrazolium
Test duration	**10 up to 21 days**	**1–2 days**
Cost	**c. £15**	**c. £30**
Indicates damage:		
– chemical	Yes	No
– mechanical	Yes	Yes
– disease	Yes (seedling blight may reduce germination level measured)	No
– drying	To some extent	Yes

Table 4. Germination and tetrazolium tests compared.

Seed health

Never sow untreated seed (certified or farm-saved) without testing for seed-borne diseases, particularly bunt and Microdochium seedling blight.

Tests for ergot, loose smut and other seedling blights may be required if a problem is suspected.

Regulatory standards and advisory thresholds to determine when to treat seed are given in Table 5.

Molecular tests provide a quick measure of whether or not a seed lot meets an advisory threshold; this is useful when there is little time between harvesting and sowing. However, results may over-predict infection levels.

Note, decisions on treatment against *Microdochium nivale*, *Septoria nodorum* and *Fusarium graminearum* should be based on the combined levels of infection for all three diseases. Where the sum of the results exceeds 10%, treatment is necessary.

Disease	Test method	Test duration	Results given as	Threshold
Bunt *Tilletia tritici*	**Wash/filtration method** Spores washed from seed surface are collected and counted using a high power microscope.	48 hours.	Spores/seed	**(A)** Treat if 1 spore/seed or more.
	Molecular test Spores are washed from seed surface. DNA is measured and related to spores/seed.	48 hours	Either over or under 1 spore/seed	**(A)** Treat if 1 spore/seed or more.
Seedling blights				
Microdochium nivale	**Agar plate test** 200 individual seeds are placed on agar plates. Fungus grows from infected seed and percentage infection is calculated.	5–10 days	% infection	**(A)** Treat if over 10% infection.
	Molecular test Seeds are crushed. *Microdochium* DNA is extracted and related to percentage infection.	48 hours	Either over or under 10% infection	**(A)** Treat if over 10% infection.
Septoria nodorum	**Agar plate test** As for *M. nivale* seedling blight.	5–10 days	% infection	**(A)** Treat if over 10% infection.
Fusarium graminearum	**Agar plate test** As for *M. nivale* seedling blight.	5–10 days	% infection	**(A)** Treat if over 10% infection.
Ergot *Claviceps purpurea*	**Visual search** A minimum of 500g for certified seed, or advisory purposes, or 1000g for certified seed higher standard, is visually examined for ergot sclerotia.	24 hours	Number of pieces in either 500g or 1000g	Minimum standards: **(A/S)** 3 pieces/500g. **(S)** 1 piece/1000g.
Loose smut *Ustilago nuda f.sp. tritici*	**Embryo extraction** Embryos are examined under a high-power microscope for loose smut mycelium.	48 hours	% infection in 1000 embryos (advisory purposes) or 2000 embryos (certification)	Maximum infection: **(A/S)** 0.5% – minimum standard **(S)** 0.2% – HVS

Table 5. Tests available for seed-borne pathogens of wheat and the statutory seed standard (S) or advisory threshold (A).