FACTSHEET

Guidelines to minimise the risk of erucic acid in double-low oilseed rape

Introduction

Most oilseed rape (OSR) varieties grown in the UK are classified as 'double-low' – also called 'double-zero' or '00'. Such varieties have low erucic acid content, making the seeds suitable for both human and animal consumption. Some UK-grown OSR varieties, such as 'HEAR' (high erucic acid rape) and other specialist oil compositions, have been bred to contain relatively high levels of erucic acid.

Erucic acid is a naturally occurring fatty acid. It is present in both OSR and related species (including several weed species associated with arable systems).

For rapeseed oil to be used in food products, erucic acid levels must not, by law, exceed 5%. This European legal limit is set to be reduced to 2%, although no timescale for implementation has been announced. The current maximum level in most contracts is already set to 2%. This includes the Federation of Oils, Seeds and Fats Association (FOFSA) contract 26A, under which most OSR is traded.

In recent years, elevated (higher than expected) levels of erucic acid have been found in seed grown from double-low varieties, with some deliveries exceeding both the 2% and 5% limits.

With standards becoming tighter, it is essential to minimise erucic acid levels in double-low OSR to meet standards and avoid penalties or rejections.

These guidelines highlight the key risk points where management can make a difference. They also provide information on record-keeping, sampling and the tests required to investigate any exceedance of legal and/or contractual limits.

Risk point 1: seed source

Irrespective of seed source, it is important to keep sealed representative samples for each variety being drilled in each field, in case of dispute. The purity of both certified and farm-saved seeds should also be checked. Information on how to take representative samples can be accessed via **ahdb.org.uk/grainsampling**

Certified seed

For certified seed sources, merchants should be asked to make a written declaration (for example, via an email) of the erucic acid content. Representative samples of seed should be kept and the certification number written on the sample label.

The risk of erucic acid contamination from certified seed is likely to be low. A double-low variety can only be added to the National List if seed tests show that it has less than 2% erucic acid content; most have less than 0.1%. Low erucic acid content is a highly stable trait, meaning varieties do not revert to being high erucic acid producers. Seed crops are also inspected in the field for off-types and seed must meet minimum standards for purity and germination (as tested by a licensed or an Official Seed Testing Station). Although there is no statutory test for erucic acid in certified seed, the Agricultural Industries Confederation and the British Society of Plant Breeders have agreed a voluntary **Code of Practice** that covers the use of gas chromatography (GC) tests on all seed and seed lots.

Farm-saved seed

Seed saved from conventional open-pollinated varieties that are grown on your own holding can be sown on your own holding. This is known as farm-saved seed and it is associated with higher risks of elevated erucic acid levels (Figure 1). Seed from hybrid varieties must not be saved. For further information, visit **bspb.co.uk/farmsavedseed**

Seed should only be saved from areas that are deemed to be at low risk of erucic acid contamination. The following land should not be used for farm-saved seed production:

- Land used previously to grow OSR associated with elevated levels of erucic acid, including HEAR varieties
- Land used previously as set aside

Seed crops should be inspected twice – soon after establishment and during flowering – to rogue out volunteer OSR.

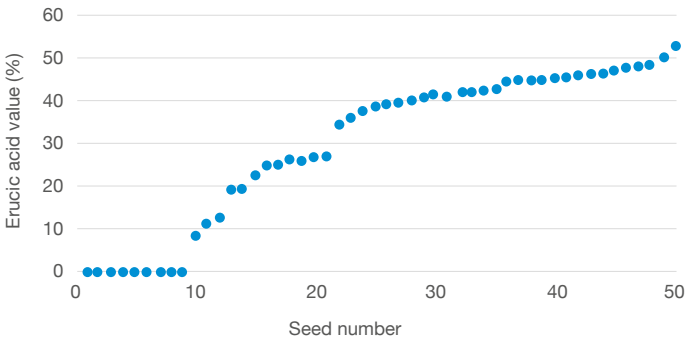

Figure 1. A heavily contaminated sample from a winter oilseed rape crop. Grown from farm-saved seed of a conventional variety, only 10 out of 50 seeds tested were classified as having a low erucic acid value. The elevated values detected are in line with those expected from cross-pollination occurring between oilseed rape with low erucic acid levels and that with high erucic acid levels.

Farm-saved seed must be harvested from parts of the field with sufficient buffer from surrounding fields and stored separately from other seed.

Tests should be conducted on representative samples to determine erucic acid levels. Each sample should be labelled so that it can be traced back to an individual field. Test results must be substantially below 2% to minimise the risk.

If farm-saved seed fails to match the quality of certified seed, it should not be used. Note: FOSFA contract 26A requires that farm-saved seed is used for one generation only.

Risk point 2: pre-planting

The primary source of contamination is likely to be from OSR volunteers with elevated levels of erucic acid and cross-pollination, rather than other factors (for example, weed seed contamination).

To ensure OSR crops maintain low levels of erucic acid, it is important to understand the history of any field used in its production. Routes of contamination mean that, ideally, 15 years' worth of (cropping/weed) data is required.

Short rotations (for example, OSR grown more than once every five years) not only reduce OSR yield, but are associated with a build-up of OSR volunteers – potentially including volunteers with elevated erucic acid. Such volunteers can contaminate double-low OSR crops in two ways: directly, through their seed; and indirectly, through cross-pollination.

Most freshly shed OSR seed has low dormancy and will germinate if adequate moisture is available. Under dry conditions, OSR seed develops dormancy in the first month after being shed, especially under cold and dark conditions. Once buried, approximately 5% of seeds will remain viable after three years and some may even be viable for up to 15 years. Any cultivation should, therefore, be delayed (ideally, by at least four weeks) to allow volunteers and weeds to emerge and be sprayed off with a non-selective herbicide.

Ploughing brings old seed to the surface. As seeds can remain viable for many years and because a single volunteer OSR plant can produce around 2,000 to 10,000 seeds, it is clear to see why their management is essential.

A predictive test is being developed by NIAB to analyse leaf samples for the presence of the genes responsible for the production of erucic acid.

Risk point 3: established crop (weeds and volunteers)

In cereal crops, volunteers can be controlled effectively with many commonly used herbicides, such as pendimethalin, diflufenican, flufenacet and ALS-inhibitors. Controlling volunteers and many erucic acid-producing weeds in OSR crops is more challenging. Growing OSR on wider rows can allow for inter-row hoeing and inter-row spraying, if suitable equipment and chemistry are available.

Clearfield® varieties, which are tolerant to specific imidazolinone herbicides, also provide an opportunity to manage weeds and volunteers. If full control is not achieved, there is a potential risk of volunteers developing with high erucic acid and herbicide-tolerant traits in the future. Clearfield® varieties also tend to be lower yielding than other varieties without the Clearfield® trait (see the AHDB Recommended Lists (RL) at **ahdb.org.uk/RL** for more information).

Examples of key erucic acid producing weeds and crops

- **Bittercress (46%)**
- **HEAR OSR (>45%)**
- **Charlock (42%)**
- **Black mustard (37%)**
- **Hedge mustard (24%)**
- **Wild radish (27%)**
- **Crane's-bill (10%)**

Although OSR volunteers have been identified as the principal cause of elevated levels of erucic acid, the high erucic acid status of some weed species means both need to be managed in the rotation. In fields where double-low OSR crops with elevated levels of erucic acid have occurred previously, alternative break crops should be considered.

Risk point 4: harvest

OSR should be harvested at the optimum stage of maturity because overripe crops will shed more seed and increase volunteer numbers. A note of any excessive pod shatter, which may increase seed shed in fields, should also be made.

Double-low varieties must be segregated from HEAR varieties at all times. Machinery, trailers and stores must be cleaned thoroughly. Farm-saved seed should also be separated from the rest of the crop. Weed seeds can be a source of erucic acid contamination, so the crop must not be contaminated.

A representative sample of each variety by field or – ideally – by trailer, should be retained. A representative sample of each load of seed leaving the farm should also be kept. If erucic acid results are obtained, they should be written on the appropriate field and seed records.

Risk point 5: contracts

Retaining representative samples provides an opportunity for retesting in case of any dispute and to identify specific fields with specific problems.

It is essential to read and understand any contract before it is signed. It is also important to keep records of all contracts. To avoid the most common problems associated with oilseed sales contracts, read the AHDB 'Oilseed sellers' checklist.

Figure 2. Representative grain samples

Erucic acid tests

Traditional methods of detecting erucic acid involve extracting oil and using gas chromatography (GC) techniques. More modern near-infrared (NIR) spectrophotometer (NIRS) scanning techniques are increasingly being used. NIRS techniques can be used at intake on whole rapeseed and are cheaper than GC methods. Recent AHDB-funded research found that NIRS can give erucic acid values that correlate well with those obtained by GC analysis of the wide range of levels (0–40%) tested. However, NIRS accuracy was found to be significantly reduced at the narrower and critical 0–5% range, with 'considerable inaccuracy' at the 0–2% range. GC remains the most accurate method, especially for measuring lower levels (below 2%).

Any elevated levels of erucic acid detected could point to a source of contamination, which will require investigation. If seed is rejected on the basis of a high NIRS test reading, it is recommended to retest using GC.

Further information

Research, publications and sources of further information referred to within this guide can be accessed via **ahdb.org.uk/erucic-acid**

Acknowledgements

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OSR harvest image © Gary Naylor Photography.

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