

INTRODUCTION

Camelina (*Camelina sativa*), also called 'Gold of Pleasure', 'German Sesame' or 'False Flax', is a summer annual oilseed plant. It is a member of the crucifer family, which also includes brassicas, mustards and several arable weeds. Camelina, like oats and rye, is considered a secondary crop because it spread into Europe as a weed of flax and cereals.

The crop was probably never widely grown in the British Isles but was popular in Eastern Europe and Russia until the early 1940s. In these regions its tolerance to poorer, less fertile conditions was appreciated. Camelina declined due to the introduction of oilseed rape and widespread use of imported palm oil.

Today, there is renewed interest in Camelina for its oil which is rich in the omega-3, alpha-linolenic acid (ALA). Ironically, this quality had contributed to its decline, due to difficulties with hydrogenating the highly unsaturated oil for margarine. Linseed (60% ALA) and Camelina (45% ALA) oils are by far the richest plant sources of omega-3. Rapeseed has lower levels of ALA (10%) and sunflower almost none. Camelina oil is more stable than linseed, due to its natural antioxidants, which also have health benefits in their own right. These tocopherols are types of vitamin E, and are used in skin creams to encourage the healing process.

AGRONOMY

The following recommendations are based on the results of a series of agronomy trials at the University of Wales, Bangor's Henfaes Research Centre and by farmers in Gwynedd, as part of the Menterra agri-innovation project:

Crop establishment

Camelina is very much a neglected and forgotten crop; hence the number of varieties is limited. Seed is currently available from UK merchants specialising in alternative crops, or direct from breeders in Austria and France.

Camelina is a low-input break crop, suitable for mixed and arable farms; thus it complies with the Welsh Assembly's policy for more sustainable production systems. It is good practice not to follow other closely related crops such as rapeseed in the rotation. Camelina is suited to most soil types. It is drought tolerant, especially later in the season, and so can be grown on poorer soil types. The crop can be winter sown but this is best avoided in areas that may be subject to late spring frosts.

The drill depth should be approx 1-2cm, row spacing 12-14cm. Modern pneumatic drills set to oilseed rape settings can achieve even shallow sowing. Problems may be experienced when using older gravity fed drills, as the seed is very small and flows too quickly. Trials showed that mixing seed with the fertilizer, broadcasting, and then rolling produced an evenly established and very successful crop. Pneumatic grassland seeders such as those produced by Einbock would be another possibility.

The sowing date ranges from end March to end April/early May, which gives a harvest date between mid August to early September. The best time to sow is when the soil has warmed to about 10°C; in Wales this can be between mid April and mid May. There is no yield penalty from sowing up to mid May, however maturity becomes later in September, when weather, dew and shortening days may hamper harvesting.

Trials have shown that there is little benefit achieved from winter sowing, aside from an earlier harvest. Winter sown crops are less competitive against weeds and more susceptible to disease. The seed rate of around 7kg/ha gives a plant population of around 220-250 plants/m². Camelina is much less able than oilseed rape to compensate for low plant density by branching.



Young Camelina crop

Crop management

The crop requires a maximum of 75kg nitrogen/ha; best applied as 35kg N/ha in the seedbed, with the remainder applied at the 4-leaf stage of growth. Trials have shown no yield benefit in increasing nitrogen applications above this level, and excess may cause problems with lodging. The crop is not responsive to P and K applications, providing soil indices are maintained above 2. If P or K is required it may be applied in the seedbed.

The crop is fast growing, produces its own natural herbicide (known as allelopathy) and competes well against weeds when an even crop is established. A good seedbed, warmth and moisture will enhance the competitiveness of the crop; hence a later sowing date may be advantageous by providing a better chance of achieving these conditions. At the time

of writing, formulations of the pre-emergence herbicide trifluralin are the only products approved for use on Camelina. Consult the current edition of the UK Pesticide Guide, or the Pesticides Safety Directorate at www.pesticides.gov.uk. Camelina is not susceptible to many diseases. Downy mildew (*Peronospora parasitica*) was observed in trials, but there are no fungicides currently registered for use on Camelina. Camelina has very few pests. The crop usually outgrows flea beetle damage, which may be a problem at the seedling stage. Seed eating birds may cause slight damage to very ripe crops.

Maturity and harvesting

The crop is less susceptible than oilseed rape to pod shatter and seed loss, and can stand undamaged for up to 6 weeks after full maturity. However it is always good practice to harvest the crop as soon as possible to preserve quality. The crop may be direct cut using a standard combine with a 3mm lower screen. If necessary the crop can be desiccated to even up ripening using glyphosate or diquat. Camelina may also be swathed and allowed to ripen in the row before harvesting. Camelina has no fibre in the stem, so is much easier to combine than linseed. Combines and trailers should be carefully sealed, as the small seed can be lost from any openings.

Average yield is approximately 0.5 – 1.0 t/acre (1.25 – 2.5t/ha). The straw can be used for animal bedding.



Mature Camelina crop, Aberdaron

Conditioning, storage and pressing

Camelina seed **must** be carefully dried (max temperature 43°C) and stored to avoid deterioration of the oil. The seed will spoil rapidly in warm damp conditions, developing off-flavours tainting the oil. The seed should be dried down quickly after harvest to around 8% moisture.

Camelina typically contains approximately 35% oil. Cold pressing is not 100% efficient, the proportion of oil extracted being dependant on the type of seed and how well the press is set up. As an example, a tonne (1000 kg) of Camelina will contain 350 kg of oil, of which the press will extract 250 kg. Cold pressing (40°C) is required, because high temperatures will damage the antioxidants. Drought, lack of sunshine during seed formation, herbicide desiccation applied too early, and downy mildew infection may all lower the oil content of the seed.

MARKETS AND USES

Camelina oil, if cold-pressed from high quality fresh seed, has a distinctive nutty, slightly cabbage-like flavour with hints of green grass and a cress-like pepper note. It is particularly suited as a base for salad dressings or in Chinese and Oriental style cooking. Test batches have been marketed recently, aimed at the speciality oil market (premium olive oils, toasted sesame, pumpkin seed etc.), with a favourable reception from consumers. The seeds themselves can be used in bread, similar to poppy or sesame. Seeds have a stronger flavour than the oil, as the seed coat contains garlic-like flavours.

At present the market is undeveloped and quite small, due to limited consumer awareness of the benefits of Camelina. However, considering the low level of input costs, and the premium nature of the product, there is significant potential for Camelina to be a profitable crop. When considering entering a contract to grow Camelina, the best advice at present is to use figures for linseed as a guide when calculating input costs.

Camelina has a wide range of applications in processed foods such as spreads, as well as cosmetics and skin creams. These all require further product development work, but could be significant markets in the future.

Camelina could be an ideal low-input crop suitable for bio-diesel production, due to its lower requirements for nitrogen fertilizer than oilseed rape.