Better Organic Business Links
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Better Organic Business Links

An Organic Centre Wales project

Making poultry feed more sustainable: the potential for oil seed crops to replace soya in organic poultry feed

Cronfa Amaethyddol Ewrop ar gyfer Datblygu Gwledig: Ewrop yn Buddsoddi mewn Ardaloedd Gwledig
The European Agricultural Fund for Rural Development: Europe Investing in Rural Areas

Llywodraeth Cymru
Welsh Government

Organic poultry rations are heavily dependent on imported soya to meet the protein requirements of the birds. However, organic and GM-free soya is becoming increasingly difficult and therefore expensive, to source, and relying so heavily on imports is not in keeping with the organic ethos. This factsheet assesses the potential to substitute soya with oil crops like oil seed rape (OSR) and sunflower from the UK.

Bird nutrition

From a nutritional point of view both sunflower and OSR can make a useful contribution to organic poultry rations (see table below). In practice, these ingredients are usually in the form of a meal, because the oil is a valuable product which is usually extracted and sold separately. Organic meals tend to have a higher nutritional value than conventional meals because the method of oil extraction permitted by organic standards is less efficient and leaves more oil, and therefore more nutrients and energy, behind in the meal. Nutritionists estimate substitution values (i.e. mass of oil crop you need to replace 1kg of soya) at 1.63:1 for OSR and 1.86:1 for sunflower.

Whole seeds are sometimes fed directly, but as discussed above, this is uncommon in purchased feed. However some poultry producers do grow oil seed crops on the range, either as small patches of pure stand or as part of a cover crop mix, and in this way give the birds the benefit of the whole seed.

	Sunflower Meal		OSR Meal
	Conventional	Organic	Conventional
Dry Matter	89.0	94.0	91.0
Protein	31.0	30.5	33.9
Oil	1.5	10.0	3.5
ME (adult)	6.5	9.0	7.0
Lysine	1.1	1.1	1.8
Methionine	0.7	0.7	0.7

Source: Ewing W. N. (1998) Feeds Directory: Commodity Products Guide and Humphreys Feed

Crop production

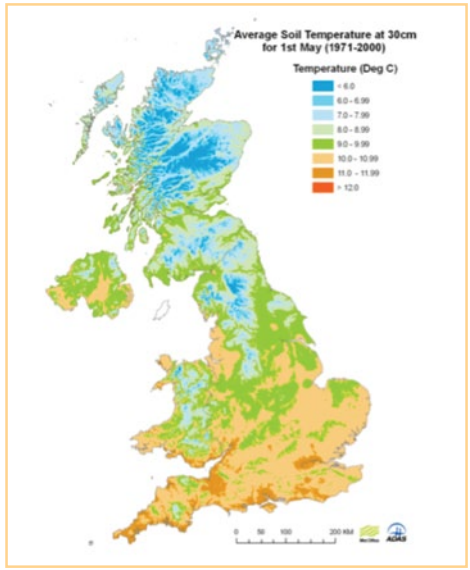
Oil seed rape

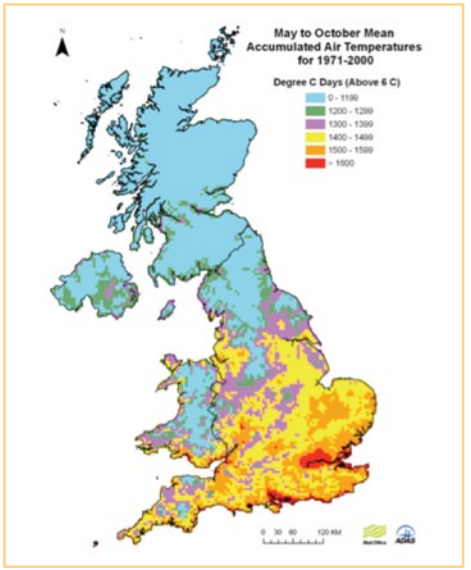
There is very little organic OSR grown in Europe and this is a reflection of the challenges associated with growing this crop successfully under organic conditions: it is a hungry crop, which means it needs to be the first crop after the fertility building phase, putting it in competition with more profitable crops such as wheat.
Pests, disease and weed problems are also difficult to manage under organic conditions. The seed also contains certain 'Anti Nutritional Factors' which reduce the quality of the feed, although this has largely been overcome by developing 'Canola' varieties which are low in these problem compounds.

Sunflower

Sunflower is an altogether more promising proposition. Establishment and growth are very dependent on temperature. Soil temperature needs to be between 6-8˚C in the top 10cm for drilling and a base daily air temperature of above 6˚C. The maps below show that the best areas for production are south of a line between the Humber and Severn estuaries. The south east corner of Wales and pockets of land in Pembrokeshire, Anglesey and the extreme NE of Wales could also support a crop.

Sunflowers grow on a wide range of soil-types but a well-drained soil that will warm up rapidly in spring is preferred. The drought-tolerance of sunflowers also makes them suitable for growing on more drought-prone soil types. The optimal pH is between 6.0 and 7.5. They yield between 1.5-2.5 t/ha when grown conventionally in the UK, and the best estimates of organic yields suggest that generally they are about 75% those of conventional although yields of 114% have been recorded.





From: Cook, S K (2009) Sunflowers and climate change In. Defra project AC0302. A Research and Innovation Network Supporting Adaptation in Agriculture to Climate Change

The deep roots of sunflower mean it can access nutrients from deep in the soil profile and can therefore yield satisfactorily at quite low levels of soil nitrogen. This means it could be grown in the second and possibly the third year after a legume based fertility break. Phosphate is required at relatively low levels, but they do need high levels of potassium. The latter is mostly returned to the soil after harvest and levels are usually adequate in an active soil with a good clay content.

The height and broadly spreading leaf-canopy of sunflower enables it to compete very effectively with weed growth from as early as the fourth week from emergence, but the crop is highly sensitive to competition during establishment. However, the late drilling date of sunflowers allows ample opportunity to control weeds by cultivation and if conditions allow for a stale seed bed and weed strike the opportunity should be taken. Insect pests are rarely an issue, but slugs can be a problem from drilling until one pair of true leaves is visible. *Botrytis cinerea*, causing head rot or grey mould, can be problem under cool (15-25˚C) and wet conditions.

Harvest should take place when seed moisture content reaches 30% or less. Oil quality does not suffer between 15 and 30% moisture content. A cereal combine can be used with little modification, but if sunflowers are grown regularly then harvesting trays can be fitted to the cutter bar. Combine settings should be similar to those used for harvesting beans and the crop should be harvested during the day and when dry.

Conclusions

- From a nutritional point of view both OSR and sunflower have potential to substitute for soya in poultry feeds.
- Of the two crops, sunflower has the greater potential under organic conditions.
- It is technically possible to produce sunflower commercially in the UK, including small areas of Wales.
- Poultry producers could grow both canola varieties of OSR and sunflower on the range either as part of a cover crop mix on the range, or in small pure stands. In this situation the birds consume the whole 'full fat' seed which has a higher nutritional value compared to meals.

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Find out more

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