

HIGH OUTPUT BIOGAS SEED OPTIONS



Bred for Britain by...

Grainseed Ltd

Feedstock Crop Choice

Feedstock crop choice for biogas (methane and carbon dioxide) production requires careful thought and planning. Although we know maximising dry matter yield is the key driver for maximising gas output, the crop production areas, required individual farm rotation, the preferred blend of plant feedstock and all other potential risks need to be considered.

Feedstock Comparisons (Estimate)

Feedstock	Preferred Dry Matter	Potential Fresh Yield t/ha	Potential Biogas Yield M ³ /tonne	Potential Biogas Yield M ³ /ha
Energy Maize Silage	28-32%	+60 t/ha	170-220	10,200 - 13,200
Wholecrop Cereals	30-36%	30 t/ha	160-200	4800 - 6000
Energy Grass Silage	26-30%	50 t/ha	160-200	8000 - 10,000
Energy Beet	20-23%	+90t/ha	170-180	15300-16200

Source - ADBA/CLA/NFU/REA Joint Paper

There is a clear correlation between fresh crop yield and biogas yield, but optimising dry matter content is crucial, as water provides no energy and will cause biogas output inefficiencies.

CHECK OPTIMUM DRY MATTER TARGET OF FEEDSTOCK FOR YOUR DIGESTOR

Energy Maize Silage

Grainseed have been testing biogas energy varieties in the UK for six years, both in official trials and on farm to ensure a good understanding of varieties, enabling sound varietal advice for our customers.

A 500KW biogas unit fed solely with maize will require approx 200 hectares of maize to be grown annually. Where such large volumes are required, a range of maturity dates should be considered to enable a suitable spread of harvest. (200ha = 7 days harvest)

Variety Selector



Es Kira

18.2t DM/ha
Maturity group 7
201,000 Mj/ha

NIAB DL 2015

Massive yields
Rapid Dry Down



Hobbit

18.9tDM/ha
Maturity group 6
211,000 Mj/ha

NIAB DL 2015

Superb early vigour
Top yielder on
NIAB list



Es Marco

18.0t DM/ha
Maturity group 7
201,000 Mj/ha

NIAB DL 2015

Potential double cobs
Drought tolerance



Dualto


17.7t DM/ha
Maturity group 7
203,000 Mj/ha

NIAB DL 2015

Excellent ME, good
drought tolerance

Other varieties available: Ballade (MC 8), Dominator (MC 8), Picker (MC 10 – ultra early harvest or late drill)

The importance of good maturity has been highlighted during the last few years and it's clear that large growers require a range of maturities to allow the spread of harvest dates required. NIAB have published an independent table of varieties suited to Biogas Production based on their UK trials results over a 5 year period.

Maize for Anaerobic Digestion - Favourable Sites - 2015 List							
							
Variety	Dry Matter Content at harvest (%)	Dry Matter Yield (t/ha)	Dry Matter Yield (% control)	ME of fresh plant at harvest (MJ/kg dry matter)	ME yield of fresh plant at harvest (1,000's MJ/ha)	Early vigour 9 = good 1 = poor	Standing power at harvest (root lodging) 9=good 1=poor
HOBBIT	29.6	18.9	111	11.15	211	7.7	8.3
ASGAARD	32.3	18.3	108	11.44	210	7.8	8.3
ATRIUM	31	17.9	105	11.69	209	7.4	8.2
LG30.223	28.3	18.8	111	11.1	209	7.6	8.3
ALFASTAR	30.6	18.3	108	11.36	208	7.5	8.3
DUALTO	30.1	17.7	104	11.47	203	6.7	8.2
ES KIRA	30.4	18.2	107	11.03	201	7.2	8.2
ES MARCO	29.2	18	106	11.15	201	6.5	8.2
FIELDSTAR	33.6	17.6	104	11.39	200	7.6	8.2
BEETHOVEN	31.8	17.9	105	11.18	200	6.9	8
MAS 11F	31.3	17.6	103	11.3	199	7.4	8.2
DOMINATOR	31.1	17.6	104	11.03	194	7	8.3
ES BALLADE	32.1	17.1	101	11.28	193	7	8.3
ES REMINGTON	34.7	17.1	101	11.27	193	7.7	8.3
ES REGAIN	34.5	17	100	11.33	192	7.7	8.3
ES PICKER	35.8	16.5	97	11.4	188	7.8	8.3
ES ARDENT	36.4	16.2	95	11.34	183	7.1	8.3

Varieties listed in Dry Matter Yield order

Mainstream varieties

Ultra Early varieties

What growers can do to ensure high maize yields every year

Soil structure: Without a doubt those growers on heavier soils that are able to winter plough benefit from the weathering process reducing power requirements to get a good seedbed. Flat lifting or sub soiling is essential on all fields. Light soils tend to have more compaction problems than heavy soils.

Fertility: If the crop hasn't got enough nutrients then yield potential will be limited. Be realistic about nutrients from animal manures and digestate, it depends when they are applied and how soon they are incorporated. In an NVZ you must conform to the closed periods and nutrient supply restrictions.

Drilling: Soil temperature, not date, determines when the crop is drilled. **Maxi Maize** placement fertiliser provides protected phosphate to the emerging seedling and being the least mobile nutrient it is essential to ensure the seedling has enough for fast establishment. Drill at 99,000 - 111,000 seeds/ha depending on seedbed conditions.

Enhanced Insecticide for wireworm control: The 2 year ban on neonicotinoid seed treatments means that we can no longer apply Poncho seed dressing for the control of wireworm and other soil borne pests. New insecticide SONIDO offers the best alternative, but it is not approved for use with Mesuro.

Weed control: Maize hates competition from all weeds. Use pre-emergence herbicides if there is sufficient soil moisture to produce a good seal to the soil surface, otherwise wait to see which weeds emerge and spray at the weed cotyledon or first true leaf stage. Do not allow weeds to get big. Many fields require 2 herbicides.

Varieties: Use proven varieties for your location. Select varieties which have been BRED FOR BRITAIN. If you are late drilling or need an early harvest then bring forward the maturity class and choose a variety with a good cob ripeness to ensure you clamp maize with 28-32% dry matter.

Opticoat™ZM treated seed provides an efficient route for the plant to uptake the essential trace elements zinc and manganese.

Harvest: Optimise dry matter by assessing plant and cob before setting harvest date. Remember that the cob contributes 50-60% of total dry matter yield. For maximising methane output, particle size should be 12mm or less. Chop length and maceration methods should reflect this.

Clamping: Using **Silostop** oxygen barrier sheets and **Secure Covers** are recommended by Grainseed to prevent clamp losses. If maize is clamped for long periods or feedout is slow consider using a chemical based additive to prevent nutrient losses during ensiling and feedout.

Energy Beet

By feeding a digester a mix of beet and maize, very high biogas outputs can be achieved. The key driver for energy beet is dry matter content and overall dry matter yield. Sugar beet types tend to produce significantly higher dry matter content and higher sugar levels, which means the beet will keep better in the field and the clamp. Newer varieties have better dirt tare scores, an important consideration for the biogas process. Grainseed have been involved with UK trials over the last three years and can make variety recommendations from reliable UK data.

Wholecrop Cereals

Another option is wholecrop cereals, and although one of the poorer producers of biogas, it may suit some farm situations to produce wholecrop silage. Cereals give flexibility for end use and choices at harvest time. Preferred particle size should be 12mm or less, and grain crackers should be used to maximise methane output. Cereals may work best as a companion feedstock with a high energy producer like maize. Wheat, barley, rye and triticale are all viable options.

Energy Rye

On farm experience has shown that some conventional and hybrid rye varieties can be useful in the rotation for biogas production. With some varieties being very vigorous, low input crops, and the fact that it can be drilled post maize harvest in September and October, it will become increasingly popular in the UK. For best energy output harvest as wholecrop when the grain is at the doughy state in June / Early July. There are several varieties to be considered e.g. Humbolt, Protector, SU Drive.

Energy Grass Silage

Grainseed can offer options as below:

Mixture	Normal Production Length of Ley	Potential fresh yield per Year t/ha	Contains	Comments
“VOLTA” Energy Mix	2 years	50t/ha	Italian Ryegrass (Diploid + Tetraploid)	Heavy yielding multicut blend. 1st cut around 15th May for optimum energy*
“DAVY” Energy Mix	4 years	47t/ha	Hybrid Ryegrass + Perennial Ryegrass	Close heading dates for maximum energy cuts. 1st cut around 18th May for optimum energy*
“ALKANE” Energy Mix	6 years	44.5t/ha	Perennial Ryegrass (Diploid + Tetraploid)	Persistent blend containing intermediate and late perennials. 1st cut around 21st May for optimum energy*

Yields will be dependant on number of cuts possible annually.
*(Ideal 1st cut dates may vary depending on location/altitude/climate). Based on NIAB 67D data.



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