

Cup plant takes AD feedstock beyond maize



“As a flowering Asteraceae that closely resembles sunflower, its value to biodiversity is obvious.”

FIONA BEALE

Cup plant could make for a compelling alternative to maize on light soils or vulnerable sites, but requires more data to secure grower buy-in. *CPM* reports on the crop’s potential.

By Andrew Watts

At between four and eight feet (1.2 - 2.4 metres) tall, cup plant (*Silphium perfoliatum*) is a sunflower-like perennial with coarse leaves. It’s deeper rooting than maize, is often higher yielding on lighter soils, and its broad canopy architecture makes it more suitable for sites vulnerable to soil erosion. So why isn’t it more popular among operators of anaerobic digestors?

It’s simply that maize is better known; is an annual crop, which is often seen as an advantage, and both AD operators and contracted growers know what they’re getting, believes Fiona Beale, independent seed merchant.

Having seen the popularity of cup plant in Germany, she decided to bring it to Great Britain. “For most AD operators, maize is the most profitable choice of feedstock and while cup plant’s biogas yield is often less than

maize, it has a superior environmental profile,” highlights Fiona. “That means it warrants consideration, especially on drought-prone sites or those vulnerable to erosion and surface run-off.”

PERENNIAL PLANT

The most obvious advantage of cup plant is that unlike maize, it’s perennial, meaning it doesn’t require re-sowing each year, she adds. “Although not a new crop, it gained acceptance as a feedstock in Germany about 15 years ago where there’s now roughly 10,000ha grown as a biogas crop, predominantly in the south. It’s not uncommon to find crops sown in 2010-11 that are still producing today in fact.”

As with maize, good establishment is fundamental to success, as is weed control, explains Fiona. “Most growers chose to under-sow maize with cup plant to give a crop in the

first year. This also provides an opportunity to control weeds pre-emergence with pendimethalin.

“In year two, it’ll yield about 80% of its potential before reaching 100% in the third year. Unfortunately crops sown three years ago in England have had to endure successive droughts which has slowed their growth and means some



Sow once to reap rewards

The most obvious advantage of cup plant is that unlike maize, it’s perennial, meaning it doesn’t require re-sowing each year, notes independent seed merchant, Fiona Beale.

ROTATIONS Alternative crops

► have yet to reach full potential,” she says.

The temptation is to compare cup plant’s output with that of maize grown on fertile soils, but Fiona says this is to misunderstand its appeal. Instead, its advantages are more practical and environmental.

“As a flowering Asteraceae that closely resembles sunflower, its value to biodiversity is obvious. It was its potential as a feed source for pollinators that helped to drive interest in Germany, as was its capacity to prevent soil erosion and surface run-off by promoting water infiltration. It’s also a winter-hardy crop, performs well in wet and dry seasons or on marginal or fertile soils.”

Interest among growers in Great Britain has so far been limited to biogas owner-operators rather than contract growers. This is partly due to the long-term commitment required, whereas maize production is often based on an annual arrangement. The seed costs too have served as disincentive, concedes Fiona.

“At roughly £2000/ha, the cost is similar to miscanthus, however it has the advantage of being a seed rather than a rhizome. We estimate that it

becomes cost neutral after five years.

“Other than weed control and the need for a molluscicide on heavier soils, the ongoing costs are minimal with nutrient requirements met through standard applications of farmyard manure or digestate depending on soil indices,” she says.

German experience suggests there are few disease or virus concerns either, although sowing immediately after oilseed rape is discouraged.

DRIVING UPTAKE

For Sean Quinn, feedstock adviser at Realistic Agri, while cup plant holds great appeal, he’s keen to emphasise that it should be seen as a complement to maize, ryegrass and wholecrop cereals, rather than a replacement.

“It’s the environmental and practical benefits that’ll drive uptake, especially on steep sites where there’s a risk of run-off, or on light soils where maize struggles to find enough moisture. I can also see it having appeal on soils high in phosphate and potash, typically indices of 4+, as a means of protecting groundwater,” he suggests.

There’s published data confirming



Complementary option

For Realistic Agri’s Sean Quinn, while cup plant holds great appeal, it should be seen as a complement to maize, ryegrass and wholecrop cereals, rather than a replacement.

BLOWING THE COMPETITION OUT THE FIELD

Xbeet® enrich 400 is the number 1 choice for 2027.

Using beneficial microbes to build on proven performance, Xbeet® enrich 400 improves germination and early growth, even in the UK’s challenging conditions.

Xbeet®
enrich 400

germain's
seed technology

We Maximise Nature's Potential

2% = **1.5t/ha***
yield increase Additional yield

*When compared to Xbeet® enrich 300 for an average 75t/ha grower. Comparison based on published data and trials carried out by ORETO accredited trials organisations comparing Germain's products. Xbeet® is a registered trademark of ABF Grain Products Ltd.

the benefits of cup plant in supporting earthworm populations too. A recent study from Germany published in the British Journal of Soil Science suggests significantly higher earthworm abundance, species diversity and richness in cup plant systems, likely because of the absence of tillage and the formation of a litter layer.

Having studied the published yield data, Sean estimates that cup plant could produce a biomethane yield that's roughly 90% of maize, but with the caveat that this is only a basic comparison as maize tends to be grown on better ground.

"Having looked at data from several sources, I estimate the yield potential of cup plant in the second year of establishment and harvested after flowering – typically late September as any earlier would make it difficult to ensile without wilting – to be about 15t dry matter/ha.

"Actual performance is of course site

dependant, with a range in the published literature varying from 12-20t DM/ha.

This equates to a fresh matter yield of 42-80t/ha at 25% DM. Consequently, biomethane yields range from 4250-6000 Nm³/ha, although some EU trials report up to 8000 Nm³/ha.

"Maize has a similar dry matter yield, typically averaging about 15t DM/ha,

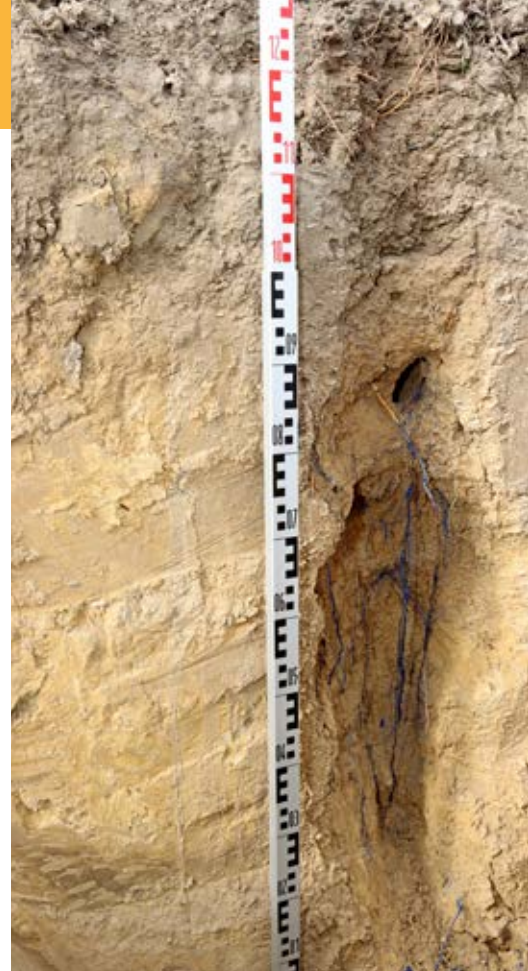
equivalent to about 50t FM at 30% DM, but is less variable as it tends to be grown on more favourable land. It's the biomethane yield of maize that gives it the edge at roughly 6000-10,000

Nm³/ha," he says.

As a perennial crop with a long lifespan, Fiona is keen to highlight its potential for carbon sequestration and the opportunities this may bring for additional revenue. "Estimates suggest cup plant sequesters about 8t Co₂/ha/year, which isn't to be overlooked, and it also holds great appeal as a stewardship cover crop.

"These opportunities are yet to be

"It's the greater root mass throughout the soil profile and to a greater depth that makes it better suited to less productive sites."



Deep rooting

Soil pit excavation showing the rooting depth of cup plant at roughly 130cm.

Have you tried the Openfield App?

- Set a price alert when a target price for Wheat, Barley or OSR has been achieved
- See when a load has been delivered and its tipped net weight and set email or text alerts*
- View your grain sample results and grain movements in real time
- View loading schedule's planned collections, variety, tonnage, timing and haulage contacts
- Anticipate collections are on their way to farm and set email or text alerts*
- Access our small seed site for our comprehensive range of Agri-Environment, Companion or Cover Crops, Forage, Grass and Game Cover seed
- Use our fertiliser selector to help identify suitable product for your farm's needs
- Access to Openview, our weekly grain market and futures update
- Access three years' worth of account details, including movement periods, contract prices and tonnage
- Follow the London wheat futures
- Send chat messages with your questions
- Use our seed selector to help identify varieties that meet your specific needs
- Access your Openfield fund and fund statements.

The Openfield App is easy to use and available to download from the App Store or Google Play, by searching for "Openfield Insight."

Openfield™



Seed, fertiliser, grain, storage.

T 01476 862730 | www.openfield.co.uk



*available when a lorry is using our tracking tool software.

Price Alerts

Loading Schedules

Collection and Delivery Alerts

Track My Truck



► realised, partly because cup plant isn't on the official schedule of agricultural plants, but we're pressing the case with DEFRA, environmental bodies and water utilities," she says.

As part of efforts to promote the advantages of cup plant, Fiona is seeking funding from the Accelerating Development of Practices and Technologies (ADOPT) Fund, part of the UK Farming Innovation Programme. One of the conditions of this award is that cup plant is trialled in areas of the country where maize isn't typically grown.

"We have commercial crops across England and Wales from Kent in the south to Yorkshire in the north, but are looking for more marginal sites. We're also investigating companion cropping options as well as encouraging plant breeder RAGT to bring its herbicide-tolerant maize to the UK. This technology would allow the use of cycloxydim herbicide, thereby expanding the weed control options when maize is under-sown with cup plant."

For Dr Michael Dickeduisberg, head of renewable resources and crop production at the North-Rhine Westphalia (NRW) chamber of agriculture, and a grower of cup plant on his family farm, the crop reflects the expectations of German society.

"Maize is damaging to soils and field access can be challenging in both the autumn when it's harvested and the spring when it's sown. Cup plant overcomes these issues," he says.

Of equal importance is the role of cup plant in challenging some of the negative stereotypes associated with maize, he adds. "Roughly one-third of the maize grown in Germany is for biogas and the large area led to increased concern for the environment and biodiversity.

"Cup plant is great for butterflies, bees and other insects, and has been shown to reduce nitrate leaching – a serious problem in some regions."

It's potential to reduce groundwater pollution has attracted the interest of several water utilities with farmers in affected areas paid €500-600/ha/year to grow it. It's also one of few crops to have truly captured the attention of the Instagram generation.

Its a photogenic crop, and we see that many younger people enjoy taking photos of it for use on social media. We've found this to be a useful way of engaging the public about the purpose of energy crops," raises Michael.

It is on lighter soils, however, where



Under-sowing

Most growers chose to under-sow maize with cup plant to give a crop in the first year.

Photo: Michael Dickeduisberg

cup plant has found a ready home. "It's the greater root mass throughout the soil profile and to a greater depth that makes it better suited to less productive sites. Whereas maize roots stop at about 90cm, we've found cup plant roots down to 150cm. Critically, there's no evidence of damage to land drains through root ingress," he says.

Yield results reflect this observation – on sandy soils, cup plant out-yielded maize by roughly 40%, comments Michael.

Equally, trials conducted by the Julius-Kühn Institut and verified by trials managed by the NRW chamber of agriculture, investigated the autumn nitrogen content of the soil at three depths for maize, cup plant and ryegrass.

"In each autumn, the amount of nitrogen available to leach over the winter months was between a quarter and half of that seen with maize and close to that seen with grass, which underlines its value in reducing the risk of groundwater contamination," highlights Michael.

Then, a replicated plot trial conducted by the NRW chamber of agriculture investigated the impact on cup plant yield when sown with maize and sown solo, and the soil N-min after harvest. "The results were compelling. There was no significant impact on cup plant yield when sown under maize and the risk of nitrate leaching was far lower too," he concludes. ●