



**BRIEFING - May 2026**

# **Miracle crops?**

Limited potential, serious risks: the environmental case for caution on intermediate and degraded-land biofuel crops in Europe

# Summary

Intermediate crops and crops grown on severely degraded land are promoted as promising new sustainable biofuel feedstocks. T&E commissioned Cerulogy to assess their environmental impacts and found they have limited potential for sustainable European production.

## **The EU's biofuel policy expansion to intermediate and degraded land crops**

The revision of the Renewable Energy Directive (RED) in 2023 raised EU targets for advanced and waste biofuels, and was followed by an expansion of its Annex IX feedstock list in 2024 to notably include intermediate crops and crops grown on severely degraded land (SDL). These feedstocks, specifically incentivised for sustainable aviation fuel (SAF) production in the current RED, are claimed to deliver environmental benefits while avoiding land use changes and competition with food production. Among them, oilseed crops are advertised as particularly promising Annex IX biofuel feedstocks, benefiting from established processing infrastructure and relatively low production costs.

Currently, intermediate crops are broadly defined to ensure their use in biofuels “does not trigger demand for additional land” and maintains soil health, while SDL crops are intended to restore low-quality soils for instance affected by severe erosion or salinisation. However, uncertainty persists regarding precise feedstock definitions, the specific sustainability safeguards and compliance thresholds required, and the practicalities of their implementation.

## **Uncertain environmental benefits and land use impact risks**

The RED requires biofuels processed in recent facilities to cut greenhouse gas emissions by at least 65% compared to fossil fuels, but Cerulogy finds that Annex IX crop biofuels emissions can vary widely depending on how the crops are grown. Fertilisers used in crop cultivation are the main driver, accounting for up to 60% of total biofuel emissions, due both to their fossil-fuel-based production and the release of potent greenhouse gases during application. While low-input and soil-friendly farming practices can improve emissions savings, strong incentives to produce biofuels may instead drive increased fertiliser use on the main crop to maximise yields, raising associated emissions and potentially eroding, or even cancelling, the overall greenhouse gas savings.

Although RED rules aim to prevent agricultural land expansion, growing these crops could still impact main crop yields and divert land from food and feed production, creating additional emissions. Some “degraded” lands may already support crops or natural ecosystems, so

converting them to biofuels may cause both indirect and direct land-use changes with potential soil carbon loss. Cerulygy also finds that in worst-case scenarios, biofuel emissions could approach or exceed those of fossil fuels.

### Domestic production potential will likely be limited

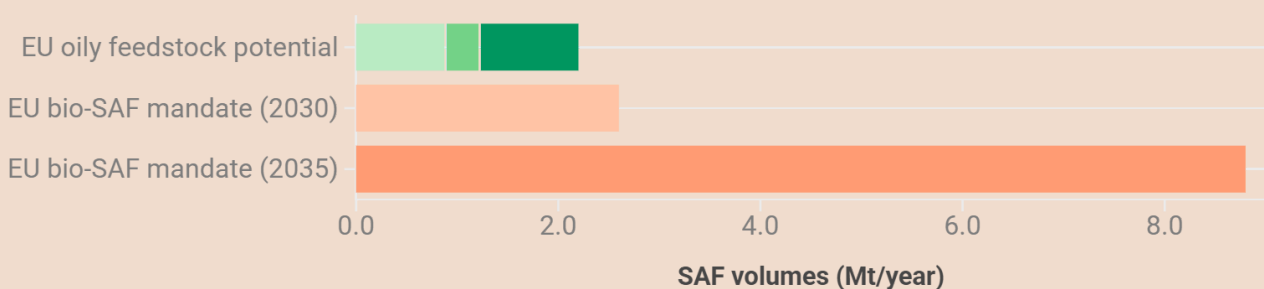
Production of intermediate and SDL crops will depend on site suitability, crop yields, growing cycles, and practical constraints. With yields generally lower than main crops and adoption limited by economic and logistical challenges, Cerulygy identifies around 7 Mha and 3 Mha of suitable areas in the EU for intermediate and SDL crops cultivation, respectively.

Such areas could produce **a maximum 1 Mt of bio-SAF**, potentially covering 40% of the EU’s 2030 bio-SAF demand. Combined with domestic waste oils, these feedstocks could theoretically meet the majority of the short term 2030 SAF targets, but rapidly scaling intermediate and SDL crops presents significant practical challenges. Furthermore, this supply remains a short-term bridge; **by 2050, these crops are estimated to cover a mere 4% of ReFuelEU’s projected demand**. Importantly, environmental integrity of all these biofuels would have to be strictly enforced to ensure they deliver the high GHG savings required to provide a credible sustainable alternative to fossil jet fuel.

### Intermediate and degraded land crops could only meet a fraction of EU bio-SAF mandates

Similarly to scarce domestic waste oils, these crops offer limited long-term potential to contribute to SAF demand when robust sustainability criteria are applied

Used cooking oil    Animal fats (1&2)    Max potential for intermediate and degraded land oily crops



Source: T&E, based on The fat of the land (Cerulygy, 2023), Unknown cooking oil (T&E, 2024) Golden Croppportunity (Cerulygy, 2025), and Down to Earth (T&E, 2025) , under industry growth scenario



Finally, EU policy gives intermediate and SDL crops a unique, highly promoted status compared with the rest of the world, making the bloc a key market. However, these strong incentives combined with limited domestic supply risk increasing reliance on imports, which are difficult to track and verify, as illustrated by suspected fraud in imported waste oils. Large-scale production abroad, particularly in the USA and South America, could compete

with European feedstocks and discourage investments in other sustainable alternative fuels, including additional, but still limited, advanced biofuels and green e-fuels.

### **T&E recommendations**

While the EU RED now incentivises intermediate and SDL crops for advanced biofuels, their claimed benefits could be negated by significant risks of fraud, land-use change, and competition with food production. T&E maintains that the promotion of these feedstocks must be secondary to the implementation of **strong, measurable safeguards and credible certification**. To avoid repeating past biofuel failures, these measures must be rigorously enforced and their effectiveness proven in practice.

- 1. Environmental benefits first.** Intermediate and SDL crops must not impact food production or increase fertiliser and pesticide use. Clear thresholds for soil carbon, salinity, and erosion should be established for SDL crops, while intermediate crops require strict criteria to prevent additional land demand. Provided environmental standards are met, these feedstocks should be prioritised for high-value uses and ensure resulting biofuels achieve at least 70% greenhouse gas savings, consistent with the thresholds for Renewable Fuels from Non Biological Origin in the RED.
- 2. Prevent import dependency and certification fraud risks.** Weak safeguards for intermediate and SDL crops risk favouring imported feedstocks, incentivising fraud, undermining domestic production, and delaying the development of more scalable, sustainable alternatives. EU policy should prioritise local feedstocks and ensure robust certification, strengthened monitoring and oversight, as well as international cooperation frameworks that allow EU authorities to conduct on-site audits.
- 3. Prioritise limited biofuel potential for hard-to-abate sectors, and for SAF in particular,** avoiding their use in road transport where direct electrification is already being scaled. Even when produced sustainably, intermediate and SDL crops should only serve as a short-term bridge, potentially via a cap similar to waste oil restrictions, with aviation decarbonisation relying on scalable solutions like green hydrogen-based fuels in the long term.

# 1. Intermediate crops and crops grown on severely degraded land: what are they?

## 1.1 Current definitions: still vague and open to different interpretations

As the revised [Renewable Energy Directive](#) (RED III) is rolled out across Member States, its higher ambition for advanced and waste biofuels has been complemented by the inclusion of new feedstocks in RED [Annex IX](#). Alongside the existing range of waste and residues, so-called intermediate crops and crops grown on severely degraded land (SDL) are now promoted. Such crops are incentivised for sustainable aviation fuels (SAF) under Annex IX Part A and capped in other sectors under Annex IX Part B.

Unlike food and feed crops, which are capped under EU biofuel policies, Annex IX crops are intended to provide greater environmental benefits without competing with food production. Productive intermediate crops can be grown during the off-season between two main crops, serving as an alternative or complement to non-productive cover crops already promoted by European agricultural policies. These practices are supposed to help maintain soil fertility, fix nitrogen, and prevent erosion. Meanwhile, cultivating crops on severely degraded land aims to restore eroded or salinated areas, theoretically returning them to productive agricultural use.

More specifically, oilseed crops such as rapeseed, camelina, carinata, or castor oil are for instance being developed due to existing vegetable oil processing infrastructure and their presumably lower production costs compared to more complex and less mature advanced biofuel pathways.

Pending the upcoming revision of the sustainability criteria and monitoring requirements in the RED [Implementing Regulation 2022/996](#), intermediate crops are broadly defined to ensure their use in biofuels does not drive agricultural land expansion and at least maintains soil health. Such crops are also limited to regions with only one crop harvest per year, to prevent the diversion of food crops to biofuel production in areas with multiple annual harvests, such as the [Brazilian safrinha corn-soy rotation](#). However, these eligibility criteria remain vague, and it is especially unclear how enforcement could prevent intermediate crops from driving additional land expansion without clearer definitions and guidelines.

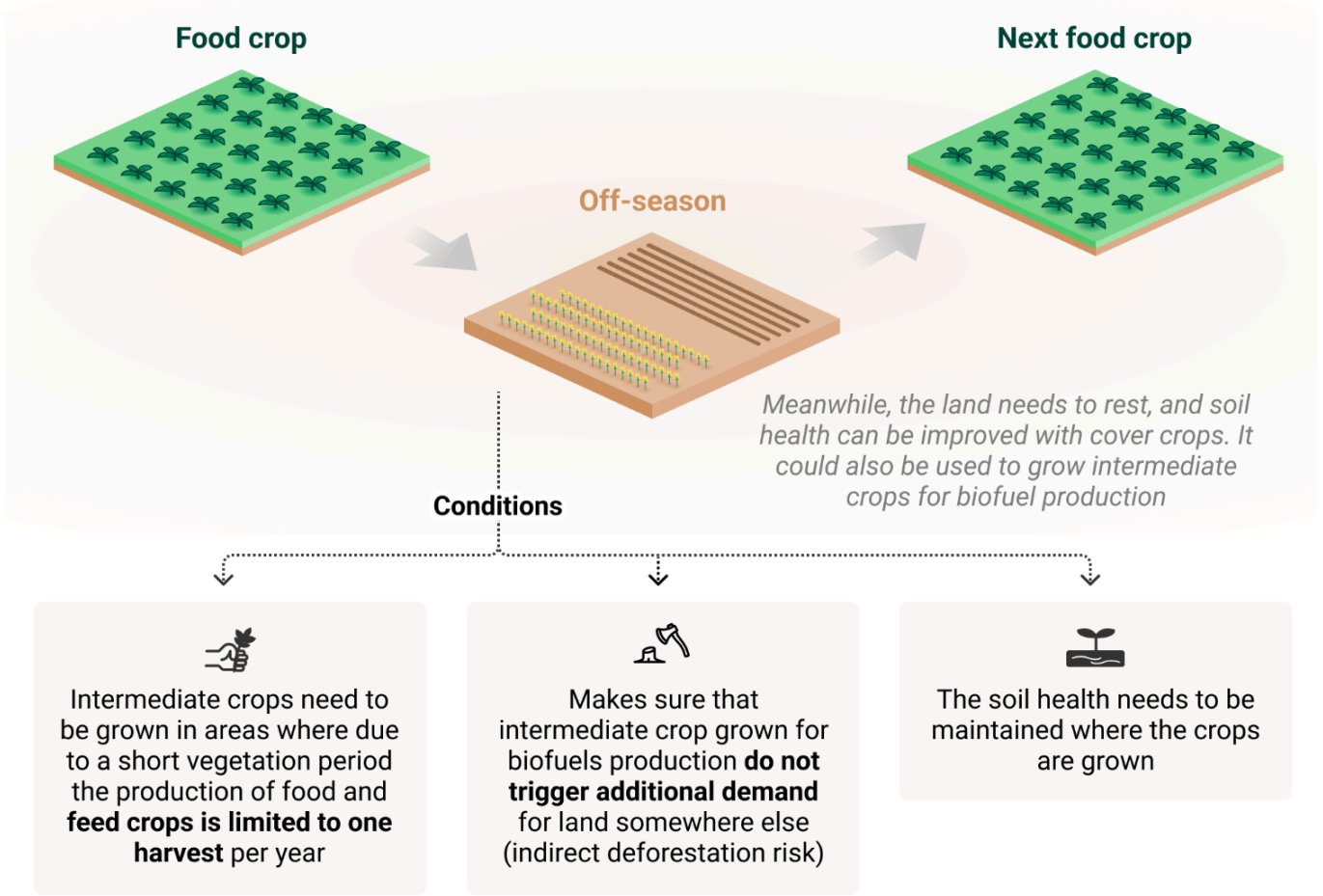
On the other hand, SDL crops are intended to restore low-quality soils affected by severe erosion or salinisation, but no official quantitative thresholds or mapping currently define which areas qualify, leaving eligibility, enforcement, and monitoring uncertain.

Such existing definitions are summarised on the next page.

# How does the EU currently define intermediate crops and crops grown on severely degraded land?

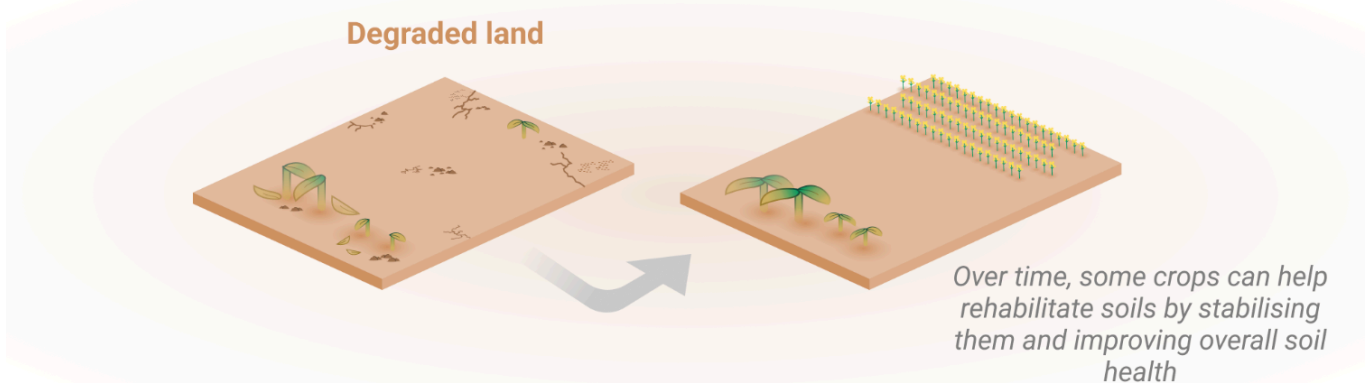
Illustrative overview of current Renewable Energy Directive definitions

## Intermediate crops



## Crops grown on severely degraded land

Severely degraded land is vaguely defined as land with excess salinity or, both eroded land and land with low organic matter content



Source: T&E



## 1.2 Existing pilot projects and industry plans

There are ongoing research and pilot initiatives exploring intermediate and SDL crops, including the [CARINA project](#) on carinata and camelina trials across multiple EU countries to assess their agronomic viability and sustainability. Building on this work, industry stakeholders are moving toward commercial use; for example, [Repsol and Bunge](#) are collaborating to process camelina and safflower into biofuels in Spain, and companies like [Saipol](#), a subsidiary of the agroindustry group Avril, announced plans to expand camelina cultivation in France.

Beyond Europe, major agribusiness and energy firms are also advancing in that field. [Nuseed and BP](#) have entered a long-term agreement to develop carinata as an oily intermediate crop for biofuel production, including SAF, helping expand production networks across the Americas and beyond. Other efforts include oil companies such as [Eni](#), which is developing castor oil cultivation on degraded land in Kenya and Congo in particular. It is however unclear under what conditions the selected areas have been assessed as severely degraded land, and several investigations have raised serious concerns over [limited local benefits](#) and potential [threats to food security](#). The success of both projects is increasingly in doubt, as the promised production volumes from these novel biofuel crops appear unmet and have even been [criticised](#) for depending on imported food crops.

## 2. These crops deliver uncertain environmental benefits

### 2.1 RED compliance will be tied to low use of nitrogen fertilisers

The RED mandates that biofuels produced in facilities that became operational after 2021 must achieve at least 65% greenhouse gas emission savings compared to fossil fuels. However, [Cerulogy's study](#) shows that when emissions from crop cultivation, biofuel processing, and transportation are included, as per the RED methodology, total emissions from Annex IX crop biofuels can vary widely depending on production practices, similarly to food and food crops. As shown below, biofuels produced from intermediate crops can lead to direct emission savings of 34-64% compared to fossil fuels, while SDL crops might offer savings of 50–73%.

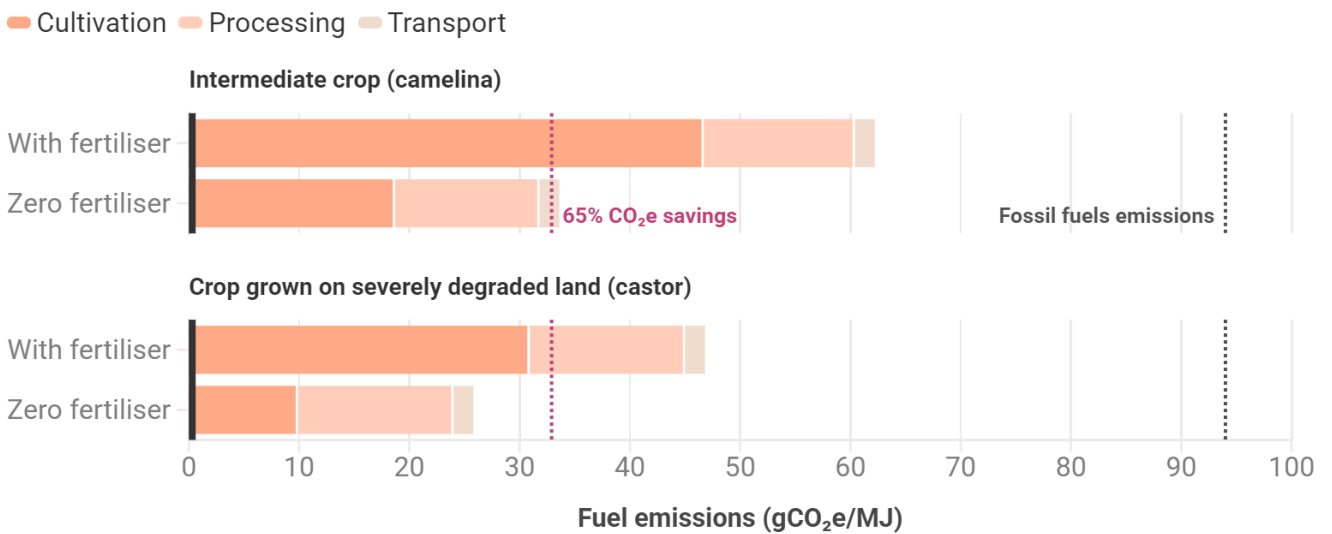
The use of nitrogen fertilisers has the largest impact, accounting for up to 60% of total biofuel emissions according to Cerulogy. Although they can help increase crop yields, nitrogen fertilisers are still predominantly produced from fossil fuels and release nitrous oxide when applied to fields, a greenhouse gas with a very high [global warming potential](#).

Lower nitrogen fertiliser use can therefore increase the emissions savings per unit of biofuel produced from intermediate or SDL crops. Practices, such as leaving residues on the field and minimising tillage after harvest, can help maintain or even improve soil organic matter, which can in turn reduce fertiliser requirements for the main crop. However, strong incentives to grow these crops for biofuel production could lead to higher overall fertiliser use. For instance, if

intermediate crops are restricted in fertiliser application to meet the RED emissions threshold, farmers might instead increase fertiliser on the main crop to improve soil fertility and support higher yields of the intermediate crop. Replacing non-productive cover crops, such as legumes, with productive oilseed intermediate crops could also increase fertiliser use, as this shift may reduce nitrogen fixation.

## Emission savings from intermediate and degraded land crop biofuels will highly depend on agricultural practices

Illustrative RED-like life-cycle emissions for biofuels from camelina and castor oil grown as intermediate crops and crops grown on severely degraded land



Source: T&E, based on Cerulogy (2025), assumes oil feedstocks processed via the HEFA pathway.



Furthermore, under the [proposed revisions to RED Annex V and VI](#), intermediate and SDL crops lack default or typical emission factors designed to encourage lower life-cycle GHG intensities. Consequently, emissions reporting will fall solely to fuel suppliers, potentially mirroring current transparency issues associated with the use of actual values.

Finally, it is worth noting that biofuel suppliers may be incentivised to use crops grown under high-input agricultural practices in older installations, thereby benefiting from the lower greenhouse gas savings thresholds permitted under Article 29 (10) of the RED. For example, facilities that began operation before October 5th, 2015 are only required to achieve a 50% reduction in total emissions compared to fossil fuels.

## 2.2 “Advanced crops” may also pose land-use impact risks

While current RED definitions explicitly state that Annex IX crops should not trigger demand for additional agricultural land, the cultivation of new biofuel crops could still lead to unintended



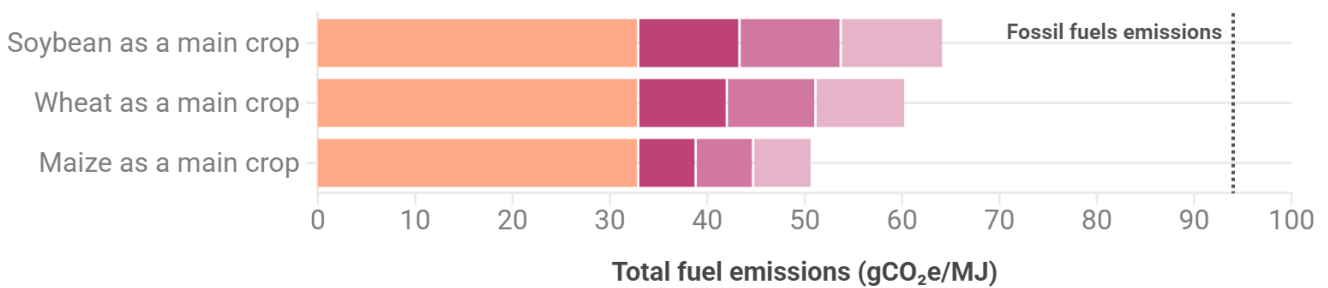
indirect land-use changes (ILUC), if not properly monitored. For example, strong RED incentives for intermediate crops grown for biofuels might increase their yields at the expense of main crop production, as already highlighted in some research projects analysed by Ceruly. This could occur through a shortened growing season for main crops or an unintended reduction in soil fertility during the main growing season, potentially affecting food and feed production and indirectly contributing to land-use changes elsewhere. Ceruly estimates that even a modest 5% reduction in main crop yields could result in up to 10 g CO<sub>2</sub>e/MJ of additional emissions in the final biofuel produced when accounting for ILUC emissions. This illustrative additional 10 g CO<sub>2</sub>e/MJ would effectively lower the 65% GHG savings threshold to around 55%.

## Impacts on main crop yields from favouring intermediate crops may bring land use change risks

Illustrative ILUC emissions from camelina biofuels in rotation with various main crops

■ Direct emissions (-65% vs fossil fuels) 
 ■ ILUC emissions with 5% reduction in main crop yields 
 ■ With 10% reduction 
 ■ With 15% reduction

### Intermediate crop (camelina)



Source: T&E, based on Ceruly (2025) and assuming ILUC emissions from EU Globiom modelling.



Cultivating crops in regions where favourable climate conditions already allow multiple growing seasons per year, such as the [Brazilian safrinha corn-soy rotation](#), could also contribute to land-use changes if these crops are diverted to biofuel production. While the “one harvest” criteria described in Section 1 are intended to exclude such crops from Annex IX eligibility, this may be subject to change pending revision of [EU Implementing Regulation 2022/996](#). Similarly, some land producing food and feed crops today could still be classified as severely degraded, and diverting it to biofuel crop cultivation could also generate ILUC impacts.

Furthermore, if left uncultivated for a long time, so-called degraded land can in some cases support natural vegetation and emerging ecosystems. Converting it back to crop production may result in direct land-use change (DLUC) and losses of soil carbon stocks. The RED provides a bonus of 29 g CO<sub>2</sub>e/MJ for biofuels produced from SDL crops to offset DLUC impacts, provided that soil carbon stocks are restored. However, Ceruly shows that biofuel emissions



from crops produced on these lands could still rise significantly, reaching up to nearly twice the emissions of fossil fuels in the worst case.

### **3. The limited role of intermediate and SDL crops in SAF demand**

Agricultural practices will not only affect the emissions and environmental impacts of Annex IX oily crop biofuels described previously, but also influence production volumes.

#### **3.1 From technical potential to actual uptake: quite some uncertainty**

Estimating the European vegetable oil production potential from intermediate crops and crops grown on severely degraded land depends first on the identification of suitable growing areas. By overlaying current cover-cropped areas with biophysically suitable zones, and separately mapping eroded, carbon-depleted, or salt-affected soils, Cerulygy identifies approximately 7 Mha suitable for intermediate oilseeds and 3 Mha for SDL crops. Together, these areas represent roughly 10% of current EU arable land. More details on Cerulygy's methodology are provided in the Annex.

In addition, crop yields and growing cycles will strongly influence production volumes. Because conditions are often less favourable than for conventional main crops, such as off-season planting and poorer soil quality, literature reviewed by Cerulygy suggest that intermediate and SDL crop yields may be 10-40% lower than similar crop varieties grown as main crops. Yield data from small-scale research trials may not be representative when extrapolated to large-scale systems. Crop rotation patterns will also vary depending on crop type and local conditions.

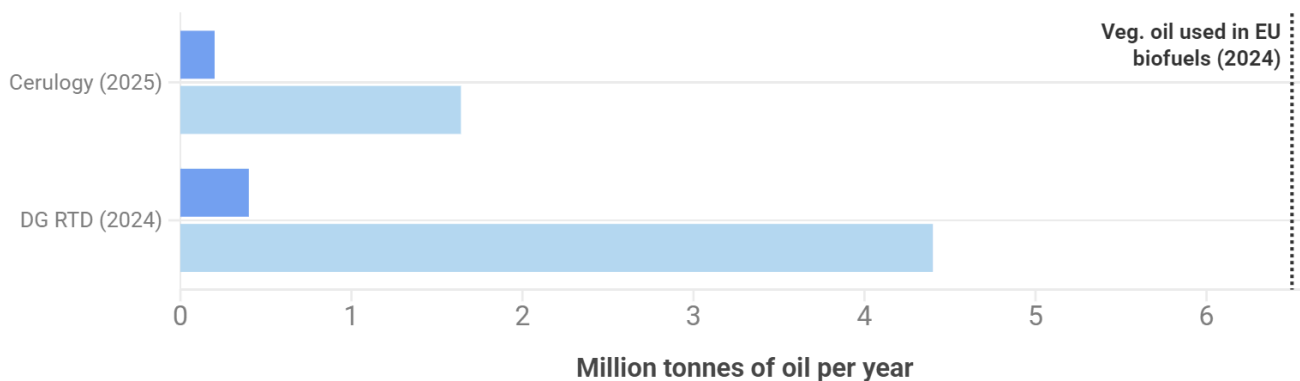
Finally, actual production will differ from technical potential because economic, biophysical, and practical constraints - like low profitability, limited expertise, seed access, and machinery - can limit farmer adoption. For instance, even under favourable conditions, Brazilian safrinha corn grown as an intermediate crop reached only 36% of the total soybean area over 25 years. In line with other European studies, Cerulygy assumed a 5-20% uptake rate for Annex IX crops, meaning that only a smaller fraction of the potential would actually be cultivated.

Taking all these factors into account, Cerulygy estimated that the combined plausible production potential for oily intermediate and SDL crops in the EU could range from 0.2 to 1.7 million tonnes per year. Assuming more optimistic yields, the [EU Commission's](#) DG RTD concluded that up to 4.4 Mt/year could be produced by 2050. In all cases, however, potential production remains below the current use of food and feed vegetable oils in EU road biofuels. Country-level estimates of Cerulygy's intermediate and SDL crop potential are shown in the Annex.

## Uncertain production potential, modest volumes for intermediate and degraded land oily crops in Europe

Yields, suitable areas, and uptake rates can highly vary, yet maximum production consistently results in limited volumes

■ Low Annex IX oily crop production potential ■ High production potential



Source: T&E, based on Cerulogy (2025) and EBB (2024)



### 3.2 Annex IX oily crops: short-term potential under strict safeguards, limited long-term role

When converting Cerulogy's production potential estimates to biofuel volumes, we find that a maximum of 1.5 Mt of fuel could be produced in the EU per year. In a jet optimised scenario, this could represent around 1 Mt of hydroprocessed esters and fatty acids (HEFA) SAF. This is the same order of magnitude as the [domestic EU potential from used cooking oil](#) (UCO), or twice [the potential from animal fats](#) with least competing uses (categories 1 and 2).

In the EU, [ReFuelEU](#) mandates an increasing share of SAF use for airlines, from 2% in 2025 to 70% in 2050. The mandate includes a growing share of e-SAF, leaving the remainder to bio-based SAF. In the short term, most bio-SAF is expected to come from residue-based oily feedstocks, such as waste oils, due to their higher technology readiness and lower cost compared with less mature and more expensive biofuels from cellulosic residues.

In this context, newly introduced intermediate and SDL crops - if they meet strict sustainability criteria and actually deliver the intended benefits - could complement the limited and nearly fully utilised domestic waste oil supply. Based on Cerulogy's findings, we estimate that domestic oily Annex IX crops could cover up to 40% of the EU's [2.6 Mt bio-SAF demand](#) in 2030, and combined with other waste oils, could in theory nearly meet the mandate. In practice, however, rapidly scaling intermediate and SDL crops to these levels within a few years will likely be challenging. Moreover, to qualify as sustainable jet fuel alternatives, these crops must meet strict sustainability safeguards, including compliance with high RED GHG thresholds, and

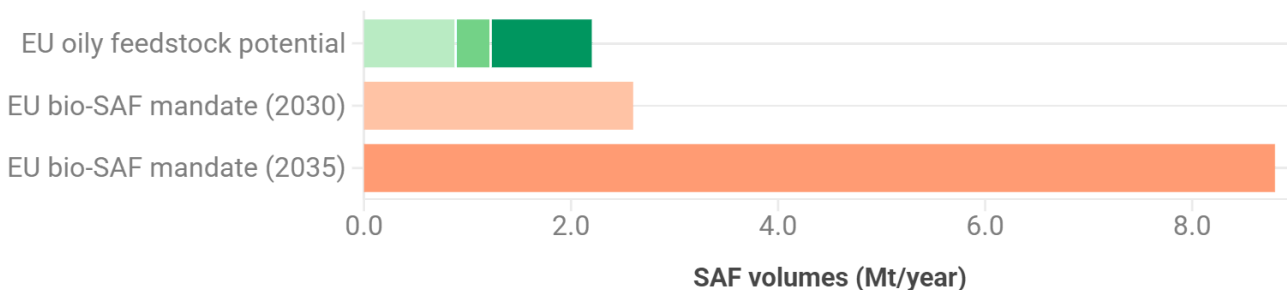
demonstrate no negative land-use impacts or competition with food crops, requirements that cannot be taken for granted, as discussed in previous sections.

In the longer-term, this feedstock pool would anyway be insufficient to meet targets. By 2050, we estimate that intermediate and SDL crops in the EU could cover only around 4% of ReFuelEU’s estimated 26 Mt bio-SAF demand. This highlights the urgent need to develop other sustainable alternatives, including additional, but still very limited, [sustainable advanced biofuels](#), and [more scalable green e-fuels](#).

## Intermediate and degraded land crops could only meet a fraction of EU bio-SAF mandates

Similarly to scarce domestic waste oils, these crops offer limited long-term potential to contribute to SAF demand when robust sustainability criteria are applied

Used cooking oil   Animal fats (1&2)   Max potential for intermediate and degraded land oily crops



Source: T&E, based on The fat of the land (Cerulogy, 2023), Unknown cooking oil (T&E, 2024) Golden Croppportunity (Cerulogy, 2025), and Down to Earth (T&E, 2025) , under industry growth scenario



### 3.3 Increasing risks of import dependency

EU fuels policy gives intermediate and SDL crops a special status, making the bloc the world’s most commercially promising market for intermediate oilseeds. Due to limited domestic potential, it thus risks increasing Europe’s dependency on imported feedstocks and biofuels. As seen with suspected fraudulent [UCO](#) and [POME](#) flows in recent years, such imports of intermediate and SDL crops would be difficult to track and verify, making compliance with European environmental safeguards challenging.

Some of the largest trials and potential for intermediate oilseeds production are occurring outside the EU, notably in the USA and South America. For example, up to 22 Mha and 28 Mha have been identified as suitable for growing camelina and carinata, primarily in Argentina and Brazil. This would translate into a potential of up to 18 Mtoe of biofuels, more than ten times the European potential identified by Cerulogy. However, it remains unclear how feasible large-scale production would be under strict safeguards to ensure these crops do not displace existing main crops or drive harmful additional land demand.

Imports of Annex IX crops and biofuels could create strong competition with domestic feedstocks, potentially lowering prices and reducing benefits for European farmers. This competitive pressure may also discourage investments in other more scalable alternative fuels, such as some other advanced biofuels and e-fuels, as developers face uncertain market returns in the face of cheaper imported feedstocks.

## **4. Certification, monitoring and transparency will be key to ensure only sustainable feedstocks end up in European biofuels**

In the EU, the standards and requirements underpinning the certification of intermediate and SDL crops are supposed to be defined in the upcoming review of Implementing Regulation 2022/996. In addition to strict sustainability safeguards, it is important that sufficient measures are taken to ensure that certification fraud is prevented in relation to intermediate crops. The consequences of certification fraud, wherein biofuels made from intermediate crops are falsely validated as Annex IX compliant, can have severe consequences for the climate, local environments and European industry.

To prevent such fraud, the EU needs to ensure there are sufficient resources and infrastructure available to analyse and investigate suspicious activity in supply chains, traded certificates, market trends and imported biofuels volumes recorded in the Union Database for biofuels. As identified by the European Commission in their [2025 investigation report](#) on certification fraud, there have been “systemic weaknesses” in how audits have been conducted. Meanwhile, T&E publications on [Palm Oil Mill Effluent](#) and [Used Cooking Oil](#) feedstocks have illustrated how the certification system has displayed shortcomings in preventing fraud, particularly in the monitoring and analysing of annual reporting of imported feedstock certificates, whereby suspicious figures were left unchecked.

Improvements to the sustainability certification framework to prevent fraud in relation to the certification of intermediate crops, beyond new technologies and Union Database compliance, should therefore include a dedicated fraud investigation unit at the EU level, market monitoring and analysis, increased transparency of audits and certificates that provide more publicly available details than the current obligated summaries, and a move away from private, industry-run Voluntary Schemes to conduct the certificates to national and EU-level regulation.

## **5. T&E recommendations**

Intermediate crops and crops grown on severely degraded land are already recognised under the EU’s Renewable Energy Directive (RED) as potential biofuel feedstocks. Their inclusion presents significant risks and challenges. While such crops could theoretically deliver environmental benefits under carefully controlled conditions, their use must avoid replicating

the harms associated with first-generation biofuels, including indirect land use change, competition with food production, increased reliance on imports, and exposure to fraud.

In this context, T&E does not advocate for the expansion of crop-based biofuel feedstocks. Rather, it acknowledges the existing regulatory framework and the European Commission's ongoing work to further define the safeguards and criteria under which these feedstocks can qualify as sustainable under RED targets. The focus, therefore, is on ensuring that any implementation avoids repeating past failures as much as possible. This will require strong criteria that are independently verifiable, alongside credible certification systems and robust monitoring mechanisms. However, given previous shortcomings, particularly in relation to waste oil imports, the effectiveness of such measures remains uncertain and will still need to be demonstrated in practice.

### **1. Environmental safeguarding first.**

Intermediate and SDL crops must not displace food production, as well as fallow or other non-productive land that supports biodiversity and soil health. Their cultivation should maintain or enhance soil carbon, prevent erosion, and avoid further land degradation. Overall, these crops should be managed with minimal environmental inputs, with fertiliser and pesticide use tightly controlled.

For intermediate crops, robust, measurable rules are needed to ensure they do not create additional land demand. Cultivation should be restricted to genuine intermediate periods and must not drive unsustainable expansion of agricultural production. Impacts on the main cropping season, including potential reductions in yields of primary crops or increased chemical inputs use, should be carefully monitored to ensure environmental benefits are not offset. For SDL, the European Commission should set clear, quantitative thresholds, such as for salinity, soil carbon, and erosion, to prevent productive land or natural areas from being misclassified as degraded and avoid land use changes.

Finally, where these crops meet strict environmental criteria, they should follow the cascading principle and be prioritised for higher-value, non-energy uses such as food, animal feed, or biomaterials. If used for biofuel production, the emphasis must be on delivering real environmental and climate benefits rather than maximising output. Any resulting fuels should, at a minimum, achieve at least 70% greenhouse gas savings, consistent with the thresholds for Renewable Fuels from Non Biological Origin in the RED.

### **2. Prevent import dependency and certification fraud risks.**

Opening the door to intermediate and SDL crops without strong environmental safeguards would risk increasing reliance on imported feedstocks. This could create incentives for fraud, outcompete domestic production and undermine the development of scalable, truly sustainable

alternatives. To minimise these risks, EU policy should explicitly prioritise local or domestic feedstocks for decarbonisation in producing countries.

Robust certification, rigorous monitoring, and international cooperation frameworks that allow for on-site auditing and inspections by EU or Member State authorities are essential to ensure that these new feedstock - regardless of their origin - deliver genuine environmental benefits while supporting European feedstock production.

### **3. Prioritise limited potential for hard-to-abate sectors, and for SAF in particular.**

Given the limited domestic potential for biofuels, sustainable intermediate and SDL crop volumes should not be used in cars and trucks, where direct electrification already provides a sustainable and scalable solution. Even when produced sustainably, using crops for energy is highly inefficient and will only be able to meet short-term bio-SAF targets. To reflect this, a cap on the uptake of intermediate and SDL crops, similar to those for waste oils, should be considered, limiting their use exclusively to the aviation sector. Long-term decarbonisation of aviation will require more scalable solutions, such as green hydrogen-based fuels.

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## **Further information**

### **Simon SUZAN**

Principal analyst, energy

T&E

[simon.suzan@transportenvironment.org](mailto:simon.suzan@transportenvironment.org)

### **Cian DELANEY**

Biofuels policy manager

T&E

[cian.delaney@transportenvironment.org](mailto:cian.delaney@transportenvironment.org)

## Annex 1. Methodological note.

To estimate land suitable for intermediate and severely degraded land crops in the EU, Cerulygy followed a multi-layered geospatial approach intersecting biophysical viability with regulatory eligibility. For productive intermediate crops, the study analysed areas currently utilising cover cropping practices, identified via farmer surveys and satellite imagery, and cross-referenced them with regions categorised as biophysically suitable. This served as a proxy for both farmer acceptance and technical feasibility.

For SDL crops, the methodology focused on three primary degradation drivers: soil erosion, modeled via the Revised Universal Soil Loss Equation (RUSLE) at a 10 t/ha/year threshold (13.8 Mha); soil organic carbon (SOC) depletion, identified using a 0.5% mass threshold applied to JRC soil databases (7.0 Mha); salinisation, mapped through JRC datasets (2.5 Mha). Crucially, to align with RED requirements, the study calculated the geospatial intersection of the eroded and low-SOC layers and combined this with salinated areas to estimate a total of 2.9 Mha of potentially qualifying SDL.

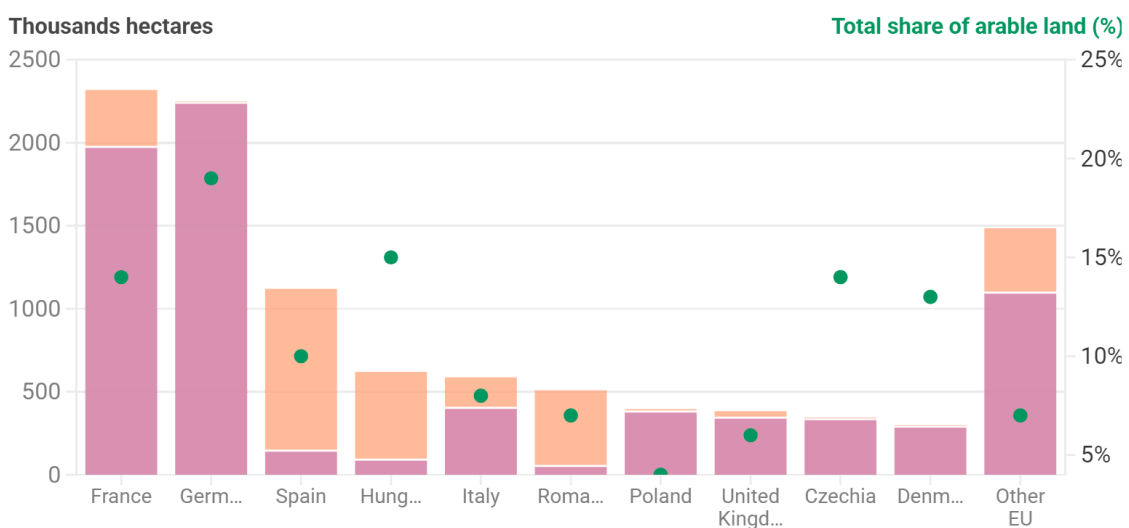
Cerulygy notes that these potential estimates remain sensitive to data resolution and the specific threshold definitions yet to be finalised in European Commission guidelines. More on Cerulygy’s methodology and assumptions in their report.

## Annex 2. Country breakdowns.

### Annex: Land suitable for intermediate and severely degraded land crops across EU countries

Available area varies widely by country and remains small relative to total current arable land

Estimated suitable area for intermediate crops For crops grown on severely degraded land



Source: T&E, based on Cerulygy (2025) and Eurostat (2023)

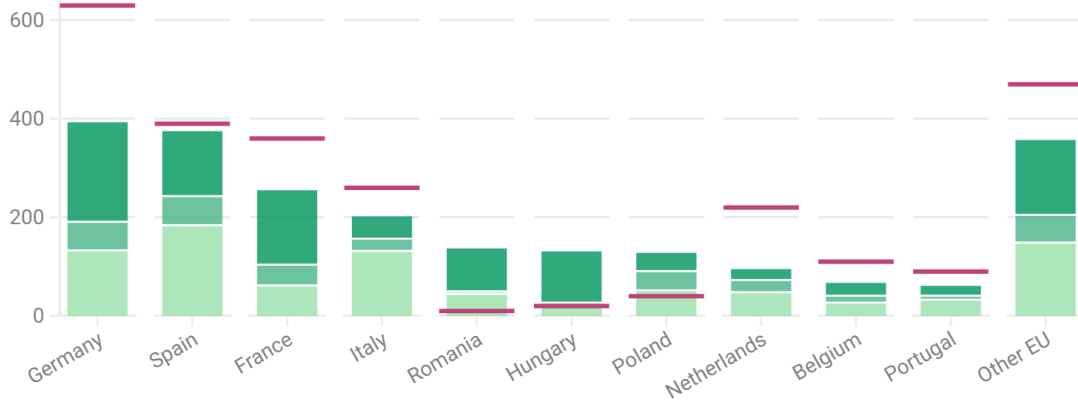


## Annex: Uneven distribution of oily feedstocks across EU countries for 2030 bio-SAF mandates

If grown sustainably, intermediate crops and crops on severely degraded land can complement waste oils to meet 2030 bio-SAF targets, but overall supply will fall short of long term demand

- 2030 bio-SAF mandates
- Used cooking oil
- Animal fats (1&2)
- Intermediate and degraded land oily crops

SAF potential and demand (kt/year)



Source: T&E, based on The fat of the land (Cerulogy, 2023), Unknown Cooking Oil (T&E, 2024), Golden Croppportunity (Cerulogy, 2025), and Down to Earth (T&E, 2025) 