



D6.6

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ABBREVIATIONS

iLUC	Indirect Land Use Change
CAP	Common Agricultural Policy
DCEP	Dissemination, Communication, and Exploitation Plan 1 st version
GA	Grant Agreement
R&D	Research and Development

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1. Introduction to CARINA

CARINA is a cross-national 4-year long Innovation Action (01/11/2022- 31/10/2026), supported by the European Union within the framework of the Horizon Europe programme.

The project focuses on new sustainable and diversified farming systems including 2 new oilseed crops, Carinata and Camelina, able to provide multiple low Indirect Land Use Change (iLUC) feedstocks for the bio-based economy. CARINA will demonstrate that increasing the diversification of cropping systems by adopting a well-thought and effective crop combination will enhance yield stability, farmers' revenue and the overall sustainability of farming systems, and, at the same time, to supplement the bioeconomy sector.

To facilitate the deployment of innovative systems, CARINA will also address certification issues of low iLUC feedstocks intended for bio-based industry. Lighthouses, Living Labs, and Policy Innovation Labs will be established across Europe playing a leading role in the co-creation of CARINA innovation actions.

CARINA capitalizes on a highly experienced team of 19 partners, +5 affiliated entities, from 13 EU and Associated Countries (Italy, France, Spain, Germany, Greece, Slovakia, Bulgaria, Poland, UK, Serbia, Tunisia, Morocco, Switzerland).

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Coordinator: ALMA MATER STUDIORUM - UNIVERSITA DI BOLOGNA

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AGRAREN UNIVERSITET - PLOVDIV	AUP	BG
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CENTRE FOR RENEWABLE ENERGY SOURCES AND SAVING FONDATION	CRES	EL
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INTERNATIONAL CENTRE FOR AGRICULTURAL RESEARCH IN THE DRY AREAS	ICARDA	LB
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2. Objectives

The current document, titled **Policy Brief, 1st version** (Policy Brief) has been elaborated within the framework of the **CARINA** project which is co-funded by the European Union's Horizon Europe framework programme under Grant Agreement No. 101081839

The Policy Brief delves into the policy frameworks necessary for the advancement of sustainable agriculture through the promotion of Carinata and Camelina crops. This section underscores the pivotal role of these crops in addressing environmental challenges and enhancing agricultural sustainability. It lays out the core objectives of the policy brief, aimed at overcoming existing barriers and leveraging opportunities within the agricultural sector. This introduction sets the stage for a comprehensive discussion on the transformative policies required to support the integration of Carinata and Camelina into existing farming systems, ultimately contributing to a more sustainable and resilient agricultural future.

In this context, the **main objectives** of the Policy Brief are to:

Present Discoveries: Summarize the project's insights into the benefits and challenges of these crops within sustainable farming systems.

Policy Analysis: Analyse current EU agricultural policies, identifying gaps that affect the competitiveness and adoption of innovative crops.

Offer Solutions: Recommend policy adjustments like increasing R&D and addressing legal and knowledge barriers to support innovative feedstocks.

Influence Policy-making: Persuade policymakers to adopt measures that align with the project's findings to promote sustainable agriculture.

Facilitate Discussion and Debate: Encourage stakeholder engagement to explore the multifaceted impacts of proposed policies.

Advocate for Change: Push for specific policy reforms that benefit sustainable farming practices and the wider adoption of Carinata and Camelina.

Provide Clear Recommendations: Detail actionable steps for policy changes.

By achieving these objectives, the Policy Brief aims to contribute significantly to the transformation of European agriculture towards more sustainable, resilient, and environmentally friendly practices, in line with EU policies and global sustainability goals.

3. Structure

The first 3 Chapters include general introduction to CARINA and the objectives of the Policy Brief with a short description of its structure. Afterwards the Policy Brief is divided into **2 main parts**:

Policy Brief (Chapter 4)

- Subchapter 4.1, Policy recommendations
- Subchapter 4.2, Design and Layout

Dissemination and Communication activities (Chapter 5)

- Subchapter 5.1 Introduction
- Subchapter 5.2 Next steps

Finally, the **Annex** of this document includes the Policy Brief 1st version (ANNEX 1) as a standalone PDF document.

The Policy Brief will undergo systematic updates and refinements throughout the duration of the project. Specifically, we anticipate releasing an updated version, D6.7, at the M46. This version will incorporate all the project's findings, presented in a comprehensive final format.

4. Policy Brief

4.1 Policy Recommendations

Growing cover- or catch crops, or engaging in intercropping practices, can have various effects, e.g., on the yields of other crops on the same area, soil or water quality, greenhouse gas emissions and biodiversity. Due to these diverse effects, and its multiple use options (food/feed, energy, chemical industry etc.), crops such as Carinata and Camelina are connected to different policy fields such as agriculture, climate, energy, and environmental policies.

Promoting innovative feedstocks requires a careful consideration where policy actions are most effective, for example, to minimize burdens for public budgets when using subsidies. Also, trade-offs between the different goals of each policy field should be minimized. For example, using feedstocks for food/feed purposes that contribute to targets in the agricultural sector reduces the resources available for contributing to renewable energy targets and vice versa. This is not the case of intermediate crops that do not compete with food. Against this background, policy needs are structured here applying the concept of market failures. This provides clear guidance for sector specific policy measures that contribute to maximizing overall (inter-sectoral) welfare, which implies the minimization of trade-offs between different policy areas.

From this perspective, the CARINA project partners agree that basic policy needs must be addressed for promoting innovative feedstocks such as Carinata and Camelina. These include:

- 1) lack of competitiveness due to environmental externalities,
- 2) lack of knowledge & technologies,
- 3) RED support and R&D promotion,
- 4) lack of experiences & information in the agriculture sector, and
- 5) lack of consumer information.

In addition to the abovementioned policy needs, additional challenges not captured by typical market failures should be considered, which include

- 6) legal barriers, social and cultural barriers, as well as
- 7) property rights barriers, and deserve additional policy recommendations.

4.1.1 Lack of competitiveness due to environmental externalities

Regarding the first barrier, Carinata and Camelina may lack competitiveness because their environmental advantages are not adequately rewarded by markets. This can refer either to environmental benefits such as enhanced carbon storage in soils, or to the reduction of environmental damages such as nitrogen leaching. These externalities are, to some extent, addressed by payments from the EU Common Agricultural Policy (CAP). However, not all Member States have decided to make areas cultivated with Carinata and Camelina eligible for such payments. Even where these crops are eligible, it is challenging to design payments that adequately reward environmental advantages. These advantages are often difficult to quantify and can comprise different dimensions that are potentially interacting with each other (carbon storage, soil nutrients, soil structure, soil erosion, biodiversity, reduced nitrogen leaching etc.).

Possible solutions include rewarding agricultural performances (cultivating Carinata and Camelina) instead of specific results of certain performances (verified eco-advantages from cultivating these crops). This approach is already implemented in the CAP's "first pillar", which couples area-based payments to measures such as covering soils in periods without main crops, regardless of variations in related benefits between different places and periods. These payments are often not effective though from the perspective of cover crops, as alternative (and often cheaper) measures for soil cover can be used alternatively to fulfil the related minimum requirements, even though they do not provide additional climate or ecosystem benefits (e.g., artificial soil covers such as foils, fleeces, or nets).

A more targeted support could therefore consist of performance-based payments in the "second pillar", that directly compensate for expenditures related to additional environmental and climate benefits. As the benefits from Carinata and Camelina can substantially vary between different regions, seasons and according to weather conditions etc., it might be reasonable to use higher or lower payments depending on the context. The CARINA project will contribute to gather knowledge on these variations that could provide a basis for such adjusted payments.

Policy recommendation 1: *Encourage Member States to make areas cultivated with Carinata and Camelina eligible for first-pillar CAP payments. Apply performance-based CAP-subsidies to account for multiple complex environmental benefits provided from crops such as Carinata and Camelina also in the second CAP-pillar. Possibly differentiate payments in the second pillar regionally and in time according to expected contributions to climate- and ecosystem services.*

4.1.2 Lack of knowledge & technologies

The second barrier, lack of technology, refers to cost disadvantages potentially resulting from the need for new machinery, adjustment of agricultural practices or new inputs such as specialized pesticides that are necessary to cultivate, store or process innovative feedstocks. For example, to minimize trade-offs with subsequent (main) crops, it can be necessary to harvest Carinata or Camelina early, which might require innovative harvesting methods including swathing or desiccant application. Besides agricultural technologies, innovations might also be necessary to optimally use these feedstocks as feed or food or in the chemical industry (production of bioherbicides, fungicides, nematicides, bio insecticides).

Currently, agricultural research is often focused on optimizing more profitable agricultural systems relying on cash crops only, neglecting development needs for innovative practices such as inter-, cover-, catch- or relay-cropping. With the private sector showing limited interest in relevant R&D activities (seeds, pesticides, harvesting, processing), public R&D subsidies or institutions could improve the situation. With evidence accumulating that innovative crops such as Carinata and Camelina are useful complements for sustainable agriculture, scaling up their production could also be promoted by temporarily increased payments in the CAP's second pillar for such feedstocks, compensating for cost disadvantages from small production quantities (lack of scale effects).

Policy recommendation 2: *Increase public R&D efforts to support necessary innovations in seeds production, pre-treatment of seeds, harvesting and processing methods and auxiliary materials and pesticides specialized for catch/cover cropping, as well as intercropping & catch/cover cropping. Increase CAP-payments (both pillars) for innovative feedstocks with clear climate and environmental advantages to account for lack of scale effects.*

4.1.3 RED support and R&D promotion

Regarding R&D promotion in use sectors, the EU Renewable Energy Directive (RED) plays a key role. While in today's RED intermediate crops are already recognized as having a significant potential, additional long-term support is desirable. Moreover, the feed market is complementary to biofuels or food markets, as oil crops crushing produced both vegetable oil and protein meals for feed. In the case of intermediate crops, this feed is additional to the existing feed production, and therefore there is no indirect land-use change risk associated.

Currently, an expansion of the RED Annex IX feedstocks is close from being finalized, being a major determinant for supporting energy from new feedstocks such as intermediate crops. The question here is whether intermediate crops like Carinata and Camelina should receive continued or even increased support from RED-related subsidies. Arguments in favour of promoting intermediate crops through RED-based support include that this instrument and related (energy) uses are well established. Such support is therefore promising for promoting climate and environmental advantages related to the feedstocks in the near term, while competitive technologies for material uses are still scarce. Considering the specificities of intermediate crops, it is appropriate to maintain long-term RED support while at the same time increasing public R&D expenditures for material applications of Carinata and Camelina. This will signal future availability of these crops for food/feed and other material use markets and reflect that the need for R&D support decreases over time.

It is important to underline here that, in accordance with the RED, intermediate crops are not considered as food or feed crop (see article 2. 40 of the RED), since they are not in competition with food and feed because they provide additional feedstock to the already existing ones. Indeed, intermediate crops are grown between main crops and do not replace them. On top of that, when Carinata or Camelina seeds are crushed, they lead to the production of around 60% of meal dedicated to feed (and that cannot be used to produce biofuels) and around 40% of oil that can be used for biofuel production.

Incentive provided by Annex IX of the RED is critical to significantly develop intermediate crops on the long term. Besides, the uses of intermediate crops in food, energy and chemical industry are not exclusive from one to another but complementary.

Policy recommendation 3: *RED support is critical for intermediate crops. This can be achieved by including them into Annex IX Part A, if their cultivation is not associated with additional land use (as currently proposed by the Commission in their latest draft proposal to expand Annex IX). This long-term support should be coupled with increased public R&D efforts to promote innovations for future material uses.*

4.1.4 Lack of experiences & information in the agriculture sector

The third barrier for cultivating and using Carinata and Camelina is a lack of experiences, references, data, and ongoing market vs conventional crops, as well as knowledge, especially (but not only) in the agricultural sector. This refers to existing knowledge that does not reach all farmers. For example, while the use of catch crops to improve soil quality has a long tradition prior to the spread of mineral fertilizers and is still common in certain areas, in other areas it is largely unknown nowadays. Farmers in these regions might lack the experience necessary to optimally plant, cultivate, harvest, store or market the feedstock, even though this knowledge might be available (elsewhere).

The EU Common Agricultural Policy (CAP) has long acknowledged this type of challenge and come to deliberately promote agricultural advisory services over the last years. However, empirical studies indicate that these services reach only a small part of the farmers. Proposals in the literature for improving the situation, that could also be applied to Carinata and Camelina, include establishing collaborative networks between farmers, increasing CAP resources for advisory services, improving access for farmers to such services, using platforms for collecting and sharing information, and a stronger engagement of trusted local sources to disseminate information.

Policy recommendation 4: *Increase efforts for information sharing related to innovative feedstocks.*

4.1.5 Lack of consumer information

In addition to agricultural knowledge, it is sometimes argued that consumers lack information about the bio-based applications and cascading use of products and byproducts of carinata and camelina, and their related environmental and economic benefits, including carbon farming. Public campaigns raising awareness on market opportunities and ecosystem services could help improve society's recognition for farmers and thus provide non-monetary incentives. Regarding the bio-based content of consumer goods, product labelling providing transparency about environmental benefits including contributions to a circular economy has been proposed.

Policy recommendation 5: *Raise public awareness and recognition for environmentally friendly low-input farming practices, and the sustainable use of products and byproducts according to a cascading process flow. Use product labels to inform consumers about bio-based content of (innovative) products.*

4.1.6 Legal barriers, social and cultural barriers

There are other challenges or opportunities for increasing the use of Carinata and Camelina that are not related to typical market failures. They include legal barriers or relate to social and cultural factors

or to property rights issues. Among several topics potentially relevant here, a recurring issue during the CARINA project and its involved stakeholders is the challenge posed by the need to acquire multiple licenses for Carinata and Camelina seeds and suitable pesticides. This challenge has also been noted in the literature, which points out that regarding innovative crops “excessively strong property rights on innovative inputs lead to their under-marketing”. Thus, patent rights, which are supposed to improve incentives for innovations, appear to have counterproductive effects on innovative value chains. While relaxing patent law restrictions, that are necessary to encourage innovations in the first place, does not seem advisable, strategies should be found to deal with this barrier. A possible remedy could consist of creating collective solutions involving larger groups of farmers interested in innovative cropping systems, to share administrative burdens involved in acquiring licenses. Also, public agencies, advisory services or other intermediaries could be engaged to provide additional expertise.

Policy recommendation 6: *Reduce difficulties related to acquiring licenses for seeds and pesticides. Possibly engage farming organizations and intermediaries such as public farm advisory services.*

4.1.7 Property rights barriers

Another challenge concerns property rights barriers in the form of short-term land leases. These can inhibit long-term planning and management, which is often required with innovative crops. Cultivating these crops is usually related to trial-and-error processes and therefore can require multiple growing seasons to stabilize and optimize yields. This challenge might be reinforced by CAP payments that are structured on an annual basis. While land leases in many cases concern private contracts and are therefore not directly subject to policy decisions, adjustments in the CAP policy framework in terms of an increased use of multi-annual payments for innovative feedstocks could positively affect private contract durations. Multi-annual payments would also address the challenge that growing innovative feedstocks usually implies high upfront investment costs, while future cost reductions are often underestimated due to behavioural biases (focus on short-term instead of long-term costs), even though such reductions can be considerable with innovative feedstocks.

Policy recommendation 7: *Use multi-annual payments to support innovative cropping systems with Carinata and Camelina to account for necessary trial and error processes, high upfront costs, and cost-perception biases.*

4.2 Design and layout

The Policy Brief is structured to facilitate readability and engagement, adhering to professional layout standards. The design is segmented into distinct sections: the Header, Main Content Area, Visual Elements, Footer, and overall design considerations.

Header: This section incorporates the project's distinctive logo in the top left, aligning with brand recognition strategies. Neighbouring, the Policy Brief's title is prominently displayed, centralized for impact, with a complementary subtitle indicating the document's type and date, thereby setting a contextual backdrop.

Main Content Area: Initiated with a bold, placeholder heading, this area delineates the introduction from subsequent content, formatted for clarity with well-spaced paragraphs. Subheadings guide the reader through a linear narrative within the single-column text layout, ensuring focused engagement.

Visual Elements: The inclusion of thematic, high-quality images at the top of each page enriches the document's context and visual appeal. A subdued background palette ensures text legibility, maintaining a clean and uncluttered aesthetic. The colour scheme, aligned with project branding, is consistently applied to titles and key features, enhancing the cohesive visual identity.

Footer: Transparency and credibility are underscored through the acknowledgment of funding sources, complemented by the European Union's logo and a content independence disclaimer. Contact details and social media icons are strategically placed for further engagement and information dissemination.

General Layout: Emphasizing cleanliness, the layout employs ample white space, avoiding overcrowding and promoting an approachable format. The systematic use of a grid layout ensures alignment and balance, contributing to the document's professional appearance.

Typography: A modern, sans-serif font is utilized throughout, supporting accessibility and readability. A clear hierarchy in text sizing differentiates between headings, subheadings, and body content, facilitating ease of navigation and comprehension.

In essence, the Policy Brief's layout is crafted to combine modern aesthetics with functional design, ensuring the document is both appealing and informative.

5. Dissemination and communication activities

5.1 Introduction

The link between D6.6 and T6.1 is foundational, as the groundwork for identifying target groups and setting communication objectives was laid out in D6.1 Dissemination, Communication, and Exploitation Plan 1st version (DCEP). This foundational document outlines the strategic approach for reaching out to and engaging with critical stakeholders relevant to the CARINA project. The process involved a particular identification and segmentation phase, where stakeholders were recognized not only by their roles but also by their potential impact and interest in the project's outcomes.

The identification phase was comprehensive, focusing on a wide array of key stakeholders pivotal to the success and dissemination of the CARINA project's objectives and findings.

These included:

- 1. Policymakers:** Individuals and entities responsible for creating and enacting laws and regulations that could be influenced by the findings and innovations of the CARINA project. They play a crucial role in integrating sustainable practices into legislative frameworks.
- 2. Industry Leaders:** Representatives from relevant sectors, such as agriculture, biotechnology, and environmental management, who can implement CARINA's solutions in practical settings, influencing industry standards and practices.
- 3. Farmers:** The primary beneficiaries and practitioners who can adopt sustainable farming techniques proposed by CARINA, impacting ground-level agricultural practices and biodiversity.

4. Environmental Groups: Organizations and advocates dedicated to preserving biodiversity and promoting sustainable practices, who can support the project's objectives and help in disseminating results to wider communities.

5. Research Institutions: Academic and scientific communities that can contribute to, validate, and further explore the CARINA project's findings, fostering innovation and scholarly discourse.

During the segmentation phase, these stakeholders were categorized based on their influence - the power to effect changes, interest - the likelihood of being affected by the project's outcomes or having a stake in its success, and needs - specific requirements or challenges that CARINA could address. This strategic segmentation aids in tailoring communication and engagement strategies to effectively reach and resonate with each group.

At the policy level, specific target groups were identified to ensure that the communication of CARINA's solutions and objectives is directed and impactful.

These groups include:

- **Certification Entities:** Bodies that can validate and endorse sustainable farming practices encouraged by the CARINA project.
- **EU Policymakers:** Key figures interested in strategies for diversifying primary production while also promoting biodiversity conservation.
- **Decision-makers:** Individuals in positions to make significant changes or adopt new policies based on CARINA's research and recommendations.
- **National and Regional Policymakers:** Local government officials who can influence agricultural policies and practices at the regional or national level, driving the adoption of sustainable and environmentally conscious farming systems.

The primary communication objectives are structured around the dissemination of CARINA's innovative solutions and the solicitation of feedback from these targeted groups. The aim is to foster a two-way communication stream, where CARINA can not only share its research outcomes and recommendations but also gather valuable insights, critiques, and suggestions from stakeholders, facilitating a collaborative and inclusive approach to sustainable agricultural development and biodiversity conservation.

5.2 Next steps

The communication objectives for the CARINA initiatives are designed to bolster interaction and procure valuable feedback. With the Policy Brief now complete, our next phase focuses on broadening understanding and involvement through the development of additional supportive materials.

We are committed to producing a variety of supplementary resources. These will be structured to make complex information more digestible and approachable, ensuring stakeholders from varied backgrounds can fully comprehend the essential messages and outcomes of the Policy Brief.

Our approach includes leveraging enhanced interactive tools to cultivate an engaging and vibrant idea exchange. This will be achieved through webinars, question-and-answer sessions, and live discussions, allowing stakeholders to probe deeper into the Policy Brief's content while providing real-time responses.

Recognizing the diverse nature of our stakeholder community, we are dedicated to customizing content to suit different groups' particular interests and concerns. This initiative may encompass generating sector-specific summaries, thematic infographics, and targeted video narratives.

A pivotal component of our strategy is the development of clear and user-friendly feedback channels. This ensures stakeholders can straightforwardly express their viewpoints, issues, and recommendations, fostering a productive dialogue that will contribute to refining and advancing the CARINA project's strategies and solutions.

Further actions to be undertaken include:

Customized Communication Materials: Creating specialized communication assets tailored to address the distinct requirements of various stakeholder groups, emphasizing the crucial insights and suggestions from the Policy Brief.

Engagement and Outreach: Arranging discussions and presentations with crucial stakeholders, such as EU policymakers and groups within agriculture and the environment, to explore the Policy Brief's conclusions and suggestions.

Media and Public Relations: Drafting and disseminating press releases, newsletter that underscore the Policy Brief's principal points and its relevance to current agricultural and environmental discussions.

Social Media and Online Presence: Utilizing the CARINA project's digital platforms to publicize the Policy Brief and share compact, engaging content that leads readers to the complete document.

Partnerships and Collaborations: Establishing partnerships with relevant NGOs, industry groups, and academic entities to jointly promote the Policy Brief and widen its audience.

Feedback Mechanism: Setting up a system for stakeholders to submit their feedback on the Policy Brief, which will be invaluable for refining the document and guiding subsequent initiatives.

This integrated strategy aims to significantly enhance the impact of the CARINA project's Policy Brief, ensuring it influences policy decisions and encourages a transition towards more sustainable agricultural practices throughout the EU.

The Policy Brief is structured as a standalone PDF document and constitutes a crucial part of D6.6, where it is included as Annex 1. Following its approval by the European Commission, we will initiate comprehensive promotional activities as mentioned above. Currently, the document is marked as a draft and has been made available on our website for preliminary viewing.

6. Conclusion and way forward

The Policy Brief, developed under the CARINA project's scope, aims to offer actionable policy recommendations, particularly focusing on sustainable farming systems. This document targets policymakers and EU Policy Officials, encapsulating the project's findings and translating them into eight strategic policy recommendations to foster advancements in sustainable agriculture.

This document reflects our concerted efforts to encapsulate the findings concisely and propose viable solutions that align with the project's objectives. The Policy Brief document is currently in its preliminary form and is designated as an integral part of Deliverable D6.6, serving as Annex 1.

It is planned that the Policy Brief will undergo a comprehensive update at M46, culminating in D6.7 - Policy Brief's Final version. This iteration will integrate all project findings, offering a holistic view of the examined area and refined policy recommendations.

Following the approval of D6.6, we anticipate initiating an extensive campaign encompassing promotional and dissemination activities. This will ensure that the insights and recommendations are effectively communicated to and can influence the relevant stakeholders, thereby contributing to the broader goals of the CARINA project and the sustainable farming sector at large.

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7. ANNEX I - Policy Brief - 1st version



Policy Recommendations for Sustainable Farming Systems: Insights from the CARINA Project

EXECUTIVE SUMMARY

Growing cover- or catch crops, or engaging in intercropping practices, can have various effects, e.g., on the yields of other crops on the same area, soil or water quality, greenhouse gas emissions and biodiversity. Due to these diverse effects, and its multiple use options (food/feed, energy, chemical industry etc.), crops such as Carinata and Camelina are connected to different policy fields such as agriculture, climate, energy, and environmental policies.

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From this perspective, the CARINA project partners agree that basic policy needs must be addressed for promoting innovative feedstocks such as Carinata and Camelina.

These include:

- 1) lack of competitiveness due to environmental externalities,
- 2) lack of knowledge & technologies,
- 3) RED support and R&D promotion,
- 4) lack of experiences & information in the agriculture sector, and
- 5) lack of consumer information.

In addition to the abovementioned policy needs, additional challenges not captured by typical market failures should be considered, which include:

- 6) legal barriers, social and cultural barriers, as well as
- 7) property rights barriers and deserve additional policy recommendations.

INTRODUCTION TO THE CARINA PROJECT

CARINA is a cross-national 4-year long Innovation Action (01/11/2022- 31/10/2026), supported by the European Union within the framework of the Horizon Europe programme. The project focuses on new sustainable and diversified farming systems including 2 new oilseed crops, Carinata and Camelina, able to provide multiple low iLUC feedstocks for the bio-based economy. The current document is an extraction of a public deliverable of the project named D6.6 – Policy Briefs 1st version.

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Policy Recommendation 1

Policy Brief
March 2024



LACK OF COMPETITIVENESS DUE TO ENVIRONMENTAL EXTERNALITIES

Regarding the first barrier, Carinata and Camelina may lack competitiveness because their environmental advantages are not adequately rewarded by markets. This can refer either to environmental benefits such as enhanced carbon storage in soils, or to the reduction of environmental damages such as nitrogen leaching. These externalities are, to some extent, addressed by payments from the EU Common Agricultural Policy (CAP). However, not all Member States have decided to make areas cultivated with Carinata and Camelina eligible for such payments. Even where these crops are eligible, it is challenging to design payments that adequately reward environmental advantages. These advantages are often difficult to quantify and can comprise different dimensions that are potentially interacting with each other (carbon storage, soil nutrients, soil structure, soil erosion, biodiversity, reduced nitrogen leaching etc.).

Possible solutions include rewarding agricultural performances (cultivating Carinata and Camelina) instead of specific results of certain performances (verified eco-advantages from cultivating these crops). This approach is already implemented in the CAP's "first pillar", which couples area-based payments to measures such as covering soils in periods without main crops, regardless of variations in related benefits between different places and periods. These payments are often not effective though from the perspective of cover crops, as alternative (and often cheaper) measures for soil cover can be used alternatively to fulfil the related minimum requirements, even though they do not provide additional climate or ecosystem benefits (e.g., artificial soil covers such as foils, fleeces, or nets).

A more targeted support could therefore consist of performance-based payments in the "second pillar", that directly compensate for expenditures related to additional environmental and climate benefits. As the benefits from Carinata and Camelina can substantially vary between different regions, seasons and according to weather conditions etc., it might be reasonable to use higher or lower payments depending on the context. The CARINA project will contribute to gather knowledge on these variations that could provide a basis for such adjusted payments.

Policy recommendation:

Encourage Member States to make areas cultivated with Carinata and Camelina eligible for first-pillar CAP payments. Apply performance-based CAP-subsidies to account for multiple complex environmental benefits provided from crops such as Carinata and Camelina also in the second CAP-pillar. Possibly differentiate payments in the second pillar regionally and in time according to expected contributions to climate- and ecosystem services.



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Policy Recommendation 2

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LACK OF KNOWLEDGE & TECHNOLOGIES

The second barrier, lack of technology, refers to cost disadvantages potentially resulting from the need for new machinery, adjustment of agricultural practices or new inputs such as specialized pesticides that are necessary to cultivate, store or process innovative feedstocks. For example, to minimize trade-offs with subsequent (main) crops, it can be necessary to harvest Carinata or Camelina early, which might require innovative harvesting methods including swathing or desiccant application. Besides agricultural technologies, innovations might also be necessary to optimally use these feedstocks as feed or food or in the chemical industry (production of bioherbicides, fungicides, nematicides, bio insecticides).

Currently, agricultural research is often focused on optimizing more profitable agricultural systems relying on cash crops only, neglecting development needs for innovative practices such as inter-, cover-, catch- or relay-cropping.¹ With the private sector showing limited interest in relevant R&D activities (seeds, pesticides, harvesting, processing), public R&D subsidies or institutions could improve the situation. With evidence accumulating that innovative crops such as Carinata and Camelina are useful complements for sustainable agriculture, scaling up their production could also be promoted by temporarily increased payments in the CAP's second pillar for such feedstocks, compensating for cost disadvantages from small production quantities (lack of scale effects).

Policy recommendation:

Increase public R&D efforts to support necessary innovations in seeds production, pre-treatment of seeds, harvesting and processing methods and auxiliary materials and pesticides specialized for catch/cover cropping, as well as intercropping & catch/cover cropping. Increase CAP-payments (both pillars) for innovative feedstocks with clear climate and environmental advantages to account for lack of scale effects.

¹E.g., Mamine, F.; Farès, M. (2020): Barriers and Levers to Developing Wheat–Pea Intercropping in Europe: A Review, Sustainability 2020, 12, 6962; doi:10.3390/su12176962.



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Policy Recommendation 3

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RED SUPPORT AND R&D PROMOTION

Regarding R&D promotion in use sectors, the EU Renewable Energy Directive (RED) plays a key role. While in today's RED intermediate crops are already recognized as having a significant potential, additional long-term support is desirable. Moreover, the feed market is complementary to biofuels or food markets, as oil crops crushing produced both vegetable oil and protein meals for feed. In the case of intermediate crops, this feed is additional to the existing feed production, and therefore there is no indirect land-use change risk associated.

Currently, an expansion of the RED Annex IX feedstocks is close from being finalized, being a major determinant for supporting energy from new feedstocks such as intermediate crops. The question here is whether intermediate crops like Carinata and Camelina should receive continued or even increased support from RED-related subsidies. Arguments in favor of promoting intermediate crops through RED-based support include that this instrument and related (energy) uses are well established. Such support is therefore promising for promoting climate and environmental advantages related to the feedstocks in the near term, while competitive technologies for material uses are still scarce. Considering the specificities of intermediate crops, it is appropriate to maintain long-term RED support while at the same time increasing public R&D expenditures for material applications of Carinata and Camelina. This will signal future availability of these crops for food/feed and other material use markets and reflect that the need for R&D support decreases over time.

It is important to underline here that, in accordance with the RED, intermediate crops are not considered as food or feed crop (see article 2. 40 of the RED²), since they are not in competition with food and feed because they provide additional feedstock to the already existing ones. Indeed, intermediate crops are grown between main crops and do not replace them. On top of that, when carinata or camelina seeds are crushed, they lead to the production of around 60% of meal dedicated to feed (and that cannot be used to produce biofuels) and around 40% of oil that can be used for biofuel production.

Incentive provided by Annex IX of the RED is critical to significantly develop intermediate crops on the long term. Besides, the uses of intermediate crops in food, energy and chemical industry are not exclusive from one to another but complementary.

Policy recommendation:

RED support is critical for intermediate crops. This can be achieved by including them into Annex IX Part A, if their cultivation is not associated with additional land use (as currently proposed by the Commission in their latest draft proposal to expand Annex IX). This long-term support should be coupled with increased public R&D efforts to promote innovations for future material uses.

²“food and feed crops” means starch-rich crops, sugar crops or oil crops produced on agricultural land as a main crop excluding residues, waste or ligno-cellulosic material and intermediate crops, such as catch crops and cover crops, provided that the use of such intermediate crops does not trigger demand for additional land;”



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LACK OF EXPERIENCES & INFORMATION IN THE AGRICULTURE SECTOR

The third barrier for cultivating and using Carinata and Camelina is a lack of experiences, references, data, and ongoing market vs conventional crops, as well as knowledge, especially (but not only) in the agricultural sector. This refers to existing knowledge that does not reach all farmers. For example, while the use of catch crops to improve soil quality has a long tradition prior to the spread of mineral fertilizers and is still common in certain areas, in other areas it is largely unknown nowadays. Farmers in these regions might lack the experience necessary to optimally plant, cultivate, harvest, store, or market the feedstock, even though this knowledge might be available (elsewhere).

The EU Common Agricultural Policy (CAP) has long acknowledged this type of challenge and come to deliberately promote agricultural advisory services over the last years. However, empirical studies indicate that these services reach only a small part of the farmers.³ Proposals in the literature for improving the situation, that could also be applied to Carinata and Camelina, include establishing collaborative networks between farmers, increasing CAP resources for advisory services, improving access for farmers to such services, using platforms for collecting and sharing information, and a stronger engagement of trusted local sources to disseminate information.⁴

Policy recommendation:

Increase efforts for information sharing related to innovative feedstocks.

³Labarthe, P.; Beck, M. (2022): CAP and Advisory Services: From Farm Advisory Systems to Innovation Support, EuroChoices 21(1), DOI: 10.1111/1746-692X.12354.

⁴Clements, J. et al. (2021): How can academic research on UK agri-environment schemes pivot to meet the addition of climate mitigation aims?, Land Use Policy Volume 106, July 2021, 105441; Labarthe, P.; Beck, M. (2022): CAP and Advisory Services: From Farm Advisory Systems to Innovation Support, EuroChoices 21(1), DOI: 10.1111/1746-692X.12354; Baumber, A. et al. (2022): Understanding the Social Licence of Carbon Farming in the Australian Rangelands, Sustainability 2022, 14, 174. <https://doi.org/10.3390/su14010174>.



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Policy Recommendation 5

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LACK OF CONSUMER INFORMATION

In addition to agricultural knowledge, it is sometimes argued that consumers lack information about farmers practicing sustainable agriculture, and about the bio-based content of products and their related environmental benefits. Public campaigns raising awareness about environmentally friendly farming could help improve society's recognition for such farmers and thus provide non-monetary incentives, for example, for growing catch or cover crops. Regarding the bio-based content of consumer goods, product labeling providing transparency about environmental benefits including contributions to a circular economy has been proposed.⁵

Policy recommendation:

Raise public awareness and recognition for environmentally friendly farming practices. Use product labels to inform consumers about bio-based content of (innovative) products.

⁵E.g, Brunet Marks, Alexia (2020): (Carbon) Farming Our Way Out of Climate Change, 97 DENV. L. REV. 497 (2020), <https://scholar.law.colorado.edu/faculty-articles/1294>.

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Policy Recommendation 6

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LEGAL BARRIERS, SOCIAL AND CULTURAL BARRIERS

There are other challenges or opportunities for increasing the use of Carinata and Camelina that are not related to typical market failures. They include legal barriers or relate to social and cultural factors or to property rights issues. Among several topics potentially relevant here, a recurring issue during the CARINA project and its involved stakeholders is the challenge posed by the need to acquire multiple licenses for Carinata and Camelina seeds and suitable pesticides. This challenge has also been noted in the literature, which points out that regarding innovative crops “excessively strong property rights on innovative inputs lead to their under-marketing”⁶. Thus, patent rights, which are supposed to improve incentives for innovations, appear to have counterproductive effects on innovative value chains as a whole. While relaxing patent law restrictions, that are necessary to encourage innovations in the first place, does not seem advisable, strategies should be found to deal with this barrier. A possible remedy could consist of creating collective solutions involving larger groups of farmers interested in innovative cropping systems, to share administrative burdens involved in acquiring licenses. Also, public agencies, advisory services or other intermediaries could be engaged to provide additional expertise.

Policy recommendation:

Reduce difficulties related to acquiring licenses for seeds and pesticides. Possibly engage farming organizations and intermediaries such as public farm advisory services.

⁶Mamine, F.; Farès, M. (2020): Barriers and Levers to Developing Wheat-Pea Intercropping in Europe: A Review, Sustainability 2020, 12, 6962; doi:10.3390/su12176962.



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PROPERTY RIGHTS BARRIERS

Another challenge concerns property rights barriers in the form of short-term land leases. These can inhibit long-term planning and management, which is often required with innovative crops. Cultivating these crops is usually related to trial-and-error processes and therefore can require multiple growing seasons to stabilize and optimize yields. This challenge might be reinforced by CAP payments that are structured on an annual basis. While land leases in many cases concern private contracts and are therefore not directly subject to policy decisions, adjustments in the CAP policy framework in terms of an increased use of multi-annual payments for innovative feedstocks could positively affect private contract durations. Multi-annual payments would also address the challenge that growing innovative feedstocks usually implies high upfront investment costs, while future cost reductions are often underestimated due to behavioral biases (focus on short-term instead of long-term costs), even though such reductions can be considerable with innovative feedstocks.

Policy recommendation:

Use multi-annual payments to support innovative cropping systems with Carinata and Camelina to account for necessary trial and error processes, high upfront costs, and cost-perception biases.



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