

# Conservation agriculture and the tools for its implementation in the context of the European Green Deal

*September 2021*

*Collaborating entities:*





## Regarding this study

This report has been prepared by PwC with the sponsorship of BAYER CROP SCIENCE and is intended to analyse and quantify the impact of Conservation Agriculture (CA) as a useful practice to contribute to compliance with environmental objectives, as well as the role of essential tools such as direct seeders and herbicides in driving and developing CA.

## Executive Summary | Context

The European Green Deal and European environmental and food strategies have established ambitious compliance objectives for which the agricultural sector and sustainable practices such as Conservation Agriculture will play an essential role



The **European Green Deal**, presented by the European Commission at the end of 2019, constitutes a road map to make the **EU economy sustainable and climate neutral** in 2050. It establishes an action plan to encourage the **efficient use of resources** by moving to a clean and circular economy and to restore **biodiversity** and **reduce pollution**.



The new **Common Agricultural Policy (CAP)** post-2020 will be built around a new, more ambitious environmental architecture adapted to the European Green Deal and aligned with the new «Biodiversity strategy for 2030» and «Farm to Fork strategy».

The following are notable among the large agriculture and sustainability projects:



### «Farm to Fork» strategy

Allows the EU's current food system to become more healthy and sustainable.



### «Biodiversity strategy for 2030»

A complete, systemic, ambitious and long-term plan for protecting nature and reversing the degradation of ecosystems.



**Conservation Agriculture** is a farming practice that offers multiple environmental, economic and social benefits. It can contribute to attaining the objectives of the European Green Deal and European strategies, as well as the specific objectives established by the European Commission for the new CAP.

### Specific Objectives (SO) of the European Commission through the new CAP post-

(Contribution of CA to the objectives) 🌿



**Economic sustainability**



SO1. Guarantee fair income for farmers



SO2. Increase competitiveness



SO3. Rebalancing of power within the food chain



**Environmental sustainability**



SO4. Take action against climate change



SO5. Protect the environment



SO6. Preserve landscapes and biodiversity



**Social sustainability**



SO7. Support of generational change



SO8. Maintain dynamic rural areas



SO9. Protect food and health quality

# Executive Summary | Relevance of CA in Spain

Conservation Agriculture is a farming system with the essential objective of conserving, improving and more efficiently using natural resources



Conservation Agriculture is a farming system that seeks to respond to environmental problems and has been determined to be an alternative that is particularly respectful and efficient in terms of natural resources.



Spain currently has **2.1 Mha under CA cultivation** and this figure is growing at an average annual rate of 4.3%. CA still has far to go and could reach 13 Mha.

## Principles on which CA is based

- 1.** Not altering arable land through tilling actions
- 2.** Permanent **vegetation coverage** on the surface.
- 3.** **Rotation of crops** and/or diversification of crops

## Relevance of CA in Spain (latest data available)

**2.1 Mha**

Surface area cultivated under CA (15% of cultivated farmland)

**11.9 Mt**

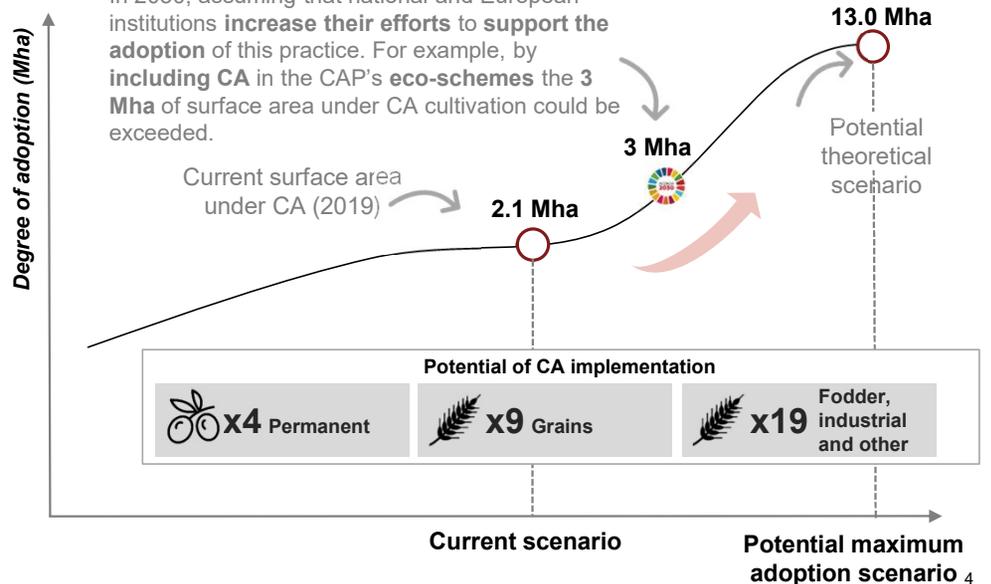
Production of CA crops

**€ 3,668 M€**

Value of CA production (12% of farm production)

## Conservation Agriculture implementation scenarios

In 2030, assuming that national and European institutions **increase their efforts to support the adoption** of this practice. For example, by **including CA** in the CAP's **eco-schemes** the **3 Mha** of surface area under CA cultivation could be exceeded.



## Executive Summary | Benefits of CA

Conservation Agriculture techniques are associated with a series of benefits that fulfil dual objectives: protect the environment and guarantee the financial viability of farming operations

### Benefits of CA

#### OE4 **Benefits for the climate**

- **Carbon sequestration** Not tilling the soil allows it to absorb the carbon previously sequestered by the crop through photosynthesis.
- **Lower CO<sub>2</sub> emissions** CO<sub>2</sub> is reduced in two ways: (i) due to the fact that the soil is not altered, the atmospheric CO<sub>2</sub> previously captured is not re-released; and (ii) the lower use of machinery associated with this farming system reduced the consumption of fuels and, as a result, the emissions associated with combustion.

#### OE5 OE6 **Benefits for water**

- **Reduction of runoff and increase in absorption** The presence of organic residue on land surfaces allows runoff to be limited in two ways: (i) lower runoff velocity on the surface; and (ii) greater protection of the soil against rain drops, which cause surface crusting.
- **Improvement of water quality** CA techniques reduce the necessary amount of fertiliser, herbicides, etc., which would otherwise be dissolved and transported by runoff water or absorbed into sediment.

#### OE4 OE5 OE6 **Benefits for the soil**

- **Erosion reduction** The vegetation coverage that characterises CA practices prevents erosion due to both water and wind. Organic crop residue left in fields encourages the retention and reduced the impact of rain, thus decreasing erosion potential. The same principle applies with respect to wind erosion, since the vegetation coverage prevents the loss of soil due to permanent contact with the wind.
- **Improvement in soil quality** The reduction of erosion improves the structure of soil and encourages the retention of organic materials, which provides greater amounts of nutrients and improves soil fertility.

#### OE6 **Biodiversity benefits**

- **Increase in the number of species** Vegetation coverage and not tilling permits a living structure to be established in the soil, consisting of microorganisms, worms, insects, etc., which contribute to the formation of the soil and its fertility.



#### **Environmental benefits of CA**

#### OE1 OE8 **Benefits for the farmer**

- **Time savings factor for farmers.** The CA characteristic of not tilling saves time for the farmer, which can then be dedicated to other production operations on the farm.
- **Energy savings.** The reduction of the use of machinery to prepare the soil translates into fuel savings and lower machinery maintenance costs.
- **Improvement in the profitability of operations.** The items listed above result in a decline in operating costs for farmers. Since conventional and conservation agriculture yields are usually the same, Conservation Agriculture provides greater benefits per hectare compared with conventional techniques based on tilling.



#### **Socio-economic benefits of CA**



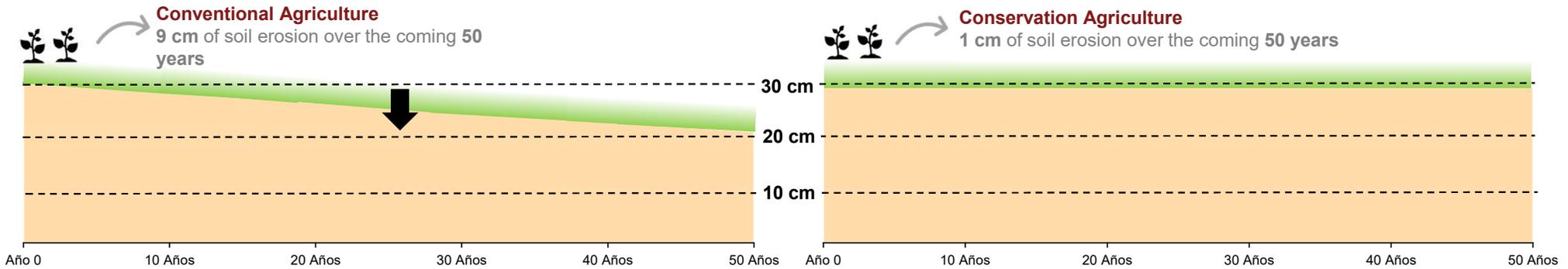
Contribution of CA to the objectives of the Green Deal / CAP

Source: Analysis by PwC and AEAC.SV

## Executive Summary | Benefits for the soil

CA prevents the loss of nearly 13 tonnes of soil per hectare and year compared with conventional agriculture, which represents financial savings in terms of depreciation of 157 M€ per year and this figure could be as high as 811 M€ in a potential maximum adoption scenario

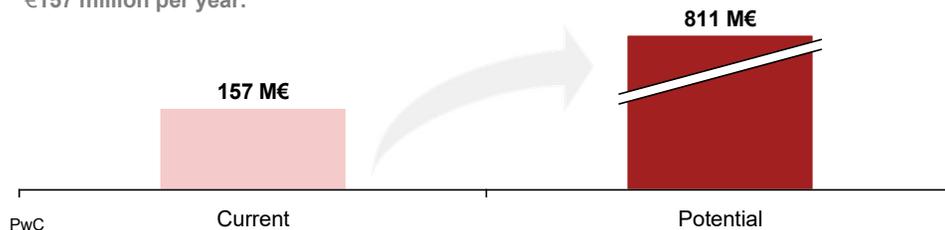
Comparison of the degree of soil erosion under Conventional Agriculture and CA scenarios



### Annual financial benefits of using CA on farmland

The financial value of the land saved when using CA techniques on the total surface area of farmland is €157 million per year.

Soil loss valued at €811 million annually could be prevented under the potential maximum adoption scenario in which all of the potential arable land uses CA techniques (13 Mha).



**13 t/ha**

CA prevents the loss due to erosion of nearly **13 tonnes** of soil per hectare and year compared with conventional agriculture.



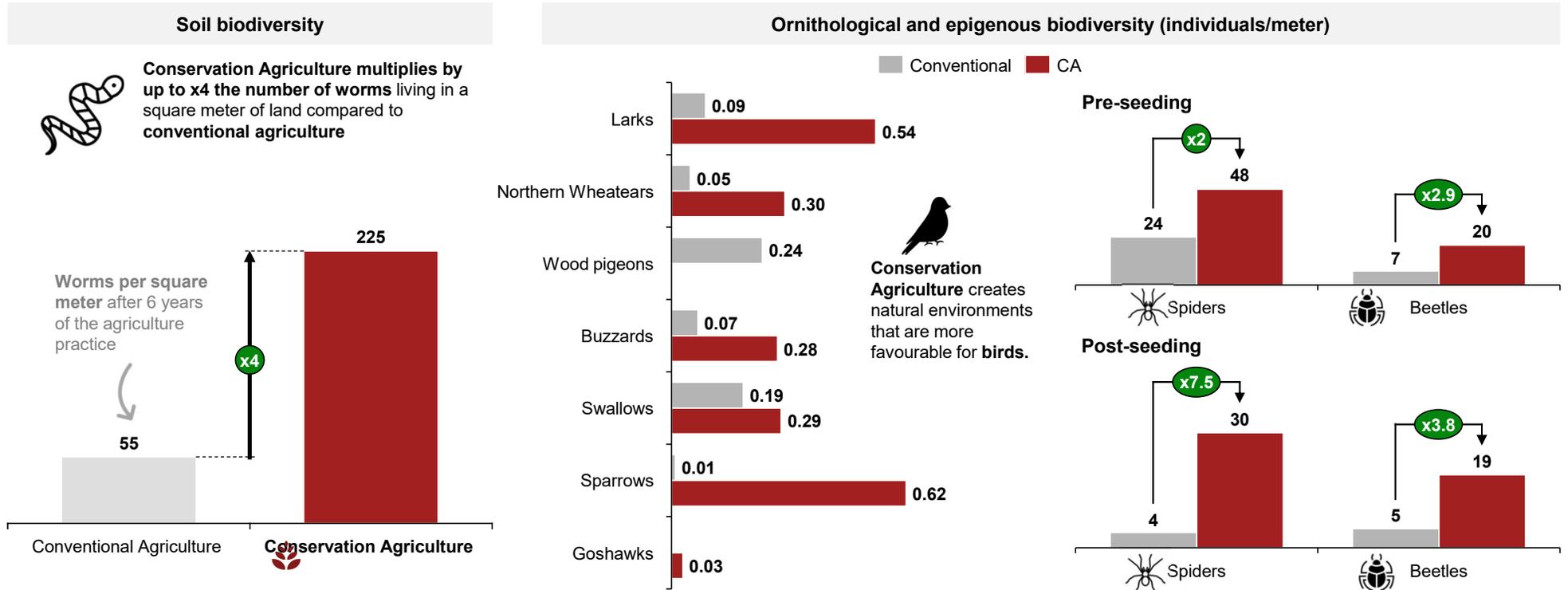
**76 €/ha**

Savings in the value of the land totaling **€76** could be attained per arable hectare/year.

## Executive Summary | Biodiversity benefits

The adoption of Conservation Agriculture is also associated with an increase in biodiversity, resulting in a multiplication of living organisms in the soil by between 2 and 7.5 times the level under conventional agriculture

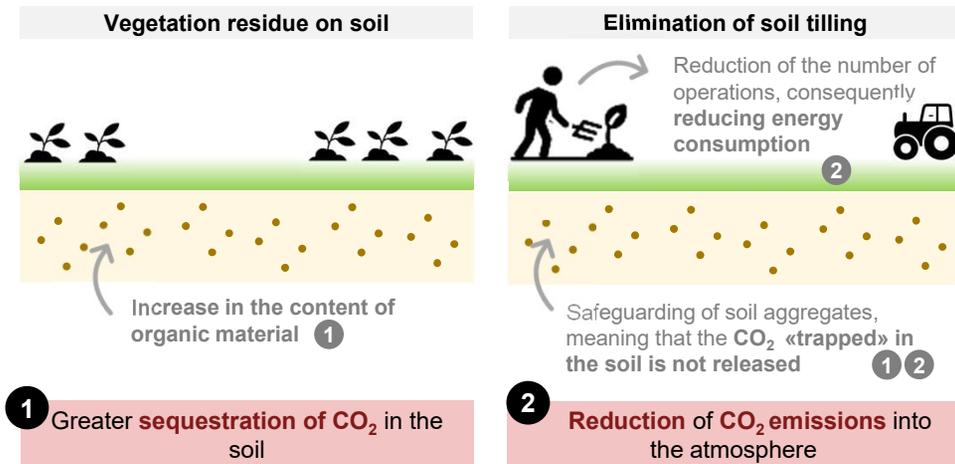
### Contribution of CA to the increase in biodiversity



## Executive Summary | Benefits for the climate

CA also contributes to mitigate climate change by preventing the emission of 10 Mt of CO<sub>2</sub> each year, and this amount could be as high as 55 Mt under the potential maximum adoption scenario, which would have an economic value of 242 M€ and 1,360 M€, respectively

### Effects of CA on CO<sub>2</sub> emissions



**4.7 t/ha**

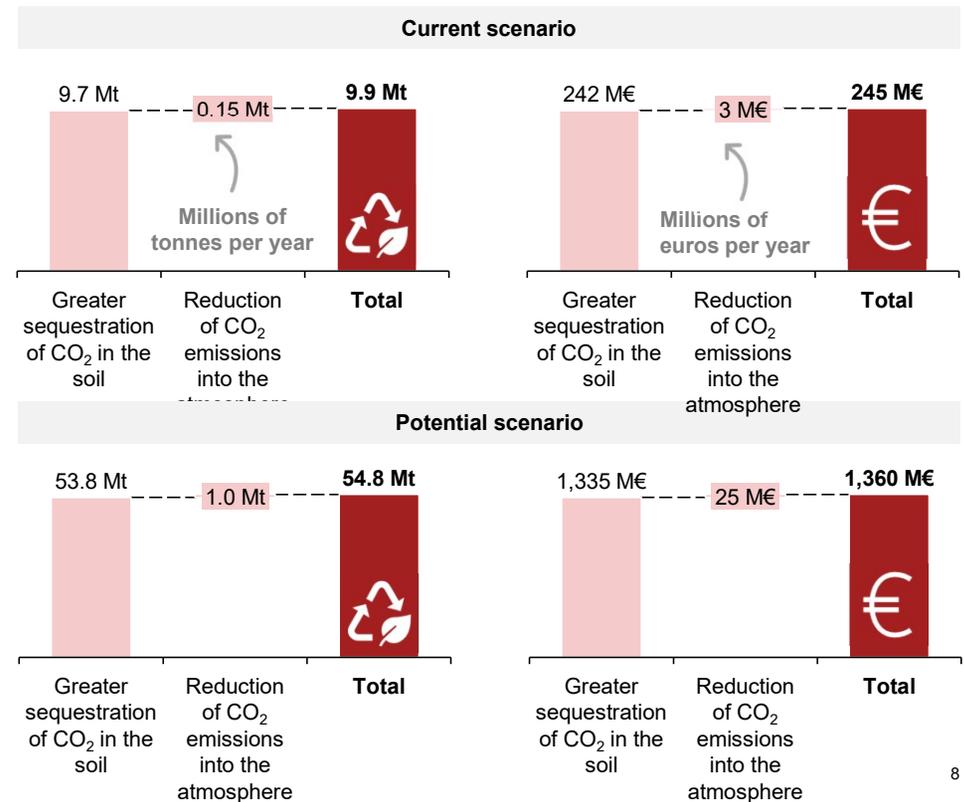
Each additional hectare using CA practices allows 4.7 tonnes of CO<sub>2</sub> to be saved.



**118 €/ha**

Each additional ha using CA practices avoids emissions valued at €118.

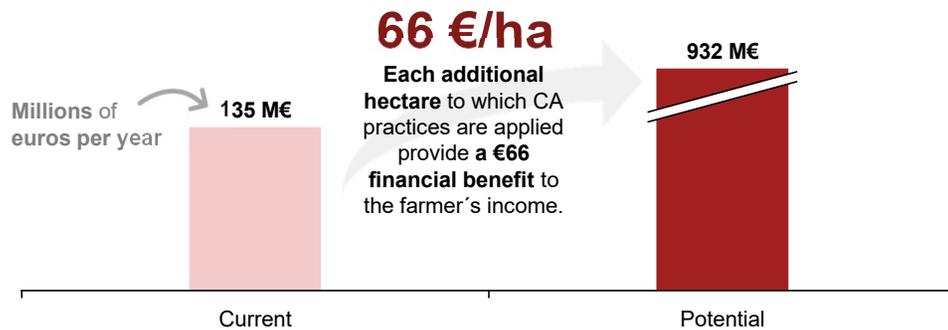
### Impact of CA on CO<sub>2</sub> emissions



## Executive Summary | Benefits for the farmer

CA is associated with lower costs and working time, which increases income for farmers by 135 M€ annually, reaching up to 932 M€ under the potential theoretical maximum adoption scenario

### Improvement in the profitability of CA operations compared with conventional farming

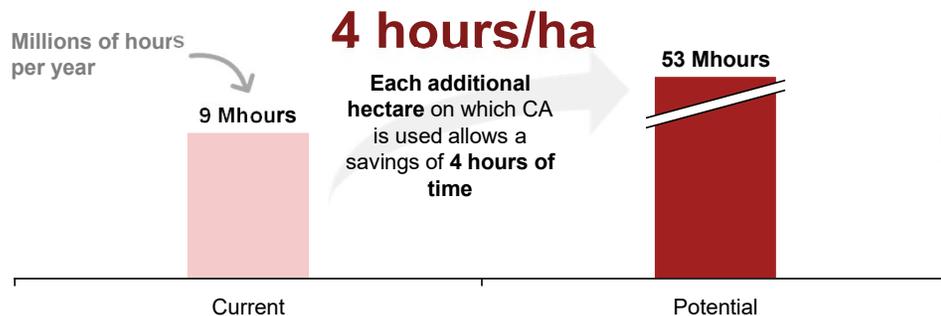


CA causes an **improvement in operating profits** for farmers, greater sustainability of the activity and an increase in financial conditions.



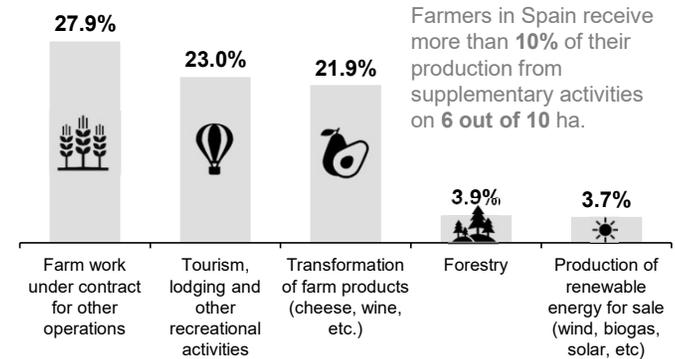
**Working time savings** allow farmers to have additional time that can be used to perform other activities on and outside of the agricultural operation.

### Savings on labour costs deriving from CA compared to conventional farming



The greater available time obtained through the use of Conservation Agriculture can be used to reconcile home and working lives or for other supplementary farming activities, which can make rural areas more dynamic.

### Main activities that supplement farming operations (2016)



## Executive Summary | Contribution to more dynamic rural areas

The environmental, economic and social benefits of Conservation Agriculture contribute to more dynamic rural areas and help fight against migration

### Socio-economic contribution of CA in Spain

CA-related farming activities directly contribute to the economy, such as through GDP and the employment created in the farming sector, while simultaneously

providing indirect or induced benefits through the economic activities that they promote within the supply chain, thanks to family consumption habits.

#### Direct contribution to GDP



**€2,213 million**

#### Direct contribution to employment



**108,824 jobs**

#### Total contribution<sup>1</sup> to GDP



**€4,285 million**

#### Total contribution<sup>1</sup> to jobs



**150,498 jobs**

1) Total impact includes the direct, indirect and induced impacts, estimated using an input-output model.

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### CA as an instrument to make rural areas more dynamic and to fight against migration

- ✓ **Environmental benefits** (Mainly reduction in soil erosion and biodiversity improvements)
- ✓ **Economic benefits** (Greater profitability of operations)
- ✓ **Social benefits** (e.g. time savings and supplemental nature of other socio-economic activities)

#### Agriculture and migration



**25%**

Twenty five percent of farmland is at great risk of abandonment.



**+ 5 Mha**

More than 5 million hectares are at risk of rural abandonment.



**68%**

Low-population areas are the homes of 68% of farmers.



**15%**

Poverty and/or social exclusion risks affect more than 15% of homes in rural areas.

## Executive Summary | Essential CA tools

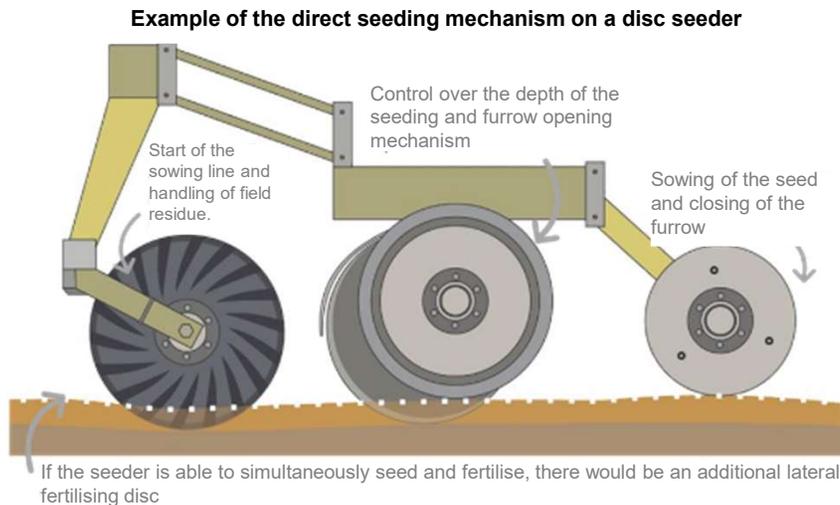
The tools essential to putting CA into practice notably include direct seeders and herbicides and glyphosate is the most used herbicide to control weeds and to protect soil nutrients

### Essential tools for CA practices

#### Direct seeders

The **sowing machinery** is more solid and must apply high pressure to the soil to ensure proper cutting and the positioning of the seeds. This means

that they tend to be heavier than those used in conventional seeding systems.



#### Herbicides

The use of conservation agriculture physically and chemically improves the soil thanks, in part, to the use of phytosanitary products such as herbicides. The elimination of weeds through the use of herbicides during fallow and pre-

seeding is essential for crops to most efficiently use water and nutrients.

The active substance glyphosate is one of the most used herbicides on most weeds.



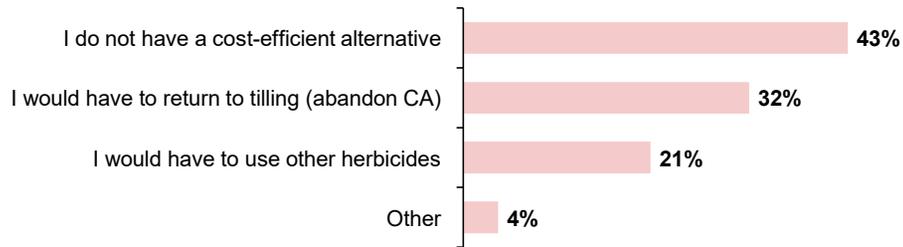
# Executive Summary | The role of the herbicide glyphosate and its socio-economic and demographic contribution

Glyphosate, which is essential to CA practices, contributes to more effective and efficient weed control than other alternatives and its use is associated with higher productivity and lower costs



In total, **25% of farm output in Spain uses glyphosate** as a means of production to control weeds at some time during the growing season.

## Alternatives that would be chosen by farmers if glyphosate were not available (2020)<sup>1</sup>



## Difference in the cost between the use of glyphosate and other alternative

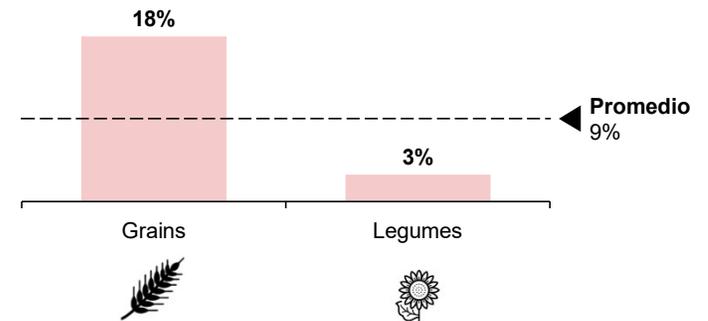
The cost of non-glyphosate alternatives is:



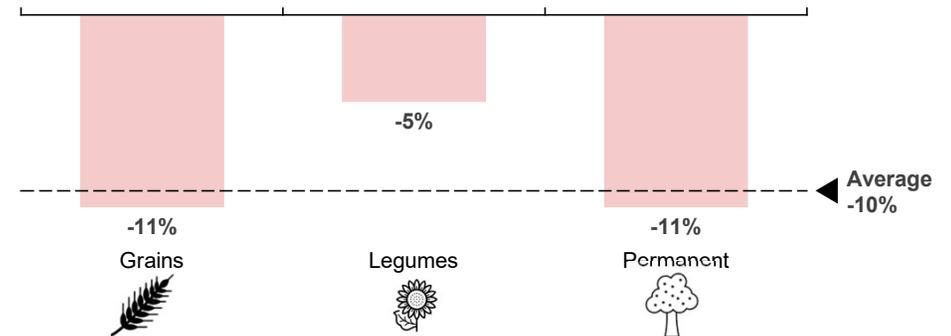
## Lack of chemical alternatives to glyphosate for some crops

**i** Some active substances that could be an alternative to glyphosate (although more expensive) cannot be used in all cases, as **some herbicides are not authorized for use on certain crop**.

## Changes in variable costs if glyphosate is eliminated (%/ha)



## Changes in production if glyphosate is eliminated (%/ha)



<sup>1</sup> European Conservation Agriculture Federation (ECAAF, 2020). Survey of all farmers in Mediterranean basin countries (Portugal, Spain, France, Italy and Greece).

## Executive Summary | Macroeconomic contribution of glyphosate

Glyphosate makes an important macroeconomic contribution, due to its relevance in the farming sector and the effect generated in associated sectors, totaling more than 2,431 M€ in terms of production, 1,087 M€ in GDP and more than 23,000 jobs

### Macroeconomic contribution of the use of glyphosate in Spain

The use of glyphosate has a **direct impact** on the farming sector. The increase in production and the reduction of costs per type of crop gives rise to an impact of **€893 million** on production, **€485 million** in terms of **GDP** and nearly **11,600 jobs**.

If associated sectors and the increase in household consumption is taken into account in addition to the direct impact, the use of glyphosate has a total associated impact of **€2,431 million in terms of production** (0.11% of domestic production) and **€1,087 million in terms of GDP** (0.09% of domestic GDP). In terms of jobs, the impact on farm production and that of the other sectors is associated with **more than 23,000 jobs** (0.12% of domestic employment).

Glyphosate also allows the generation of a positive **foreign trade balance** in the farming sector of more than **€750 million**.

Summary of the estimated impacts associated with the use of glyphosate in agriculture (2019)

	Impact on the farming sector 	Impact on associated sectors 	Impact on households 	Total impact
<b>Production</b> 	893 M€	914 M€	624 M€	<b>2,431 M€</b> (0.11% of domestic production)
<b>GDP</b> 	485 M€	280 M€	322 M€	<b>1,087 M€</b> (0.09% of domestic GDP)
<b>Employment</b> 	11,598 jobs	5,497 jobs	5,987 jobs	<b>23,082 jobs</b> (0.12% of total jobs)
<b>Trade balance</b> 	754 M€			



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