

# Climate Change Adaptation and Mitigation: Opportunities in Cropping Systems

Ligita Melece, Ilze Shena

Institute of Agricultural Resources and Economics, Department of Bioeconomics, Struktoru 14, Riga, LV-1039, Latvia

## Introduction

There are various widely accepted and evidence based effective climate change mitigation and adaptation options. Most important of them are as follows: change of tillage practices, permanent crops; winter cover of land (i.e., cover crops & catch crops); organic farming; carbon sequestration; improvement of soil properties; biodiversity conservation (agrobiodiversity, i.e., crop genetic diversity).

## Materials and methods

The principal **materials** are as follows: various sources of literature, e.g., scholars' articles, the reports of institutions. The data mainly were obtained from Eurostat (<http://ec.europa.eu>) and database of Central Statistical Bureau (<http://www.csb.gov.lv/en/>). For comparison countries in the Baltic Sea Region, only the EU Member States (Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland and Sweden) were chosen. The mixed **methods**, combining suitable qualitative and quantitative research methods have been used.

## Results

Implementation of some above indicated mitigation & adaptation measures to climate change are presented.

### Crop diversity

Growing tendency toward expansion of commercial monocultures (esp., cereals) is observed in the Baltic States, i.e., Latvia (Fig. 1).

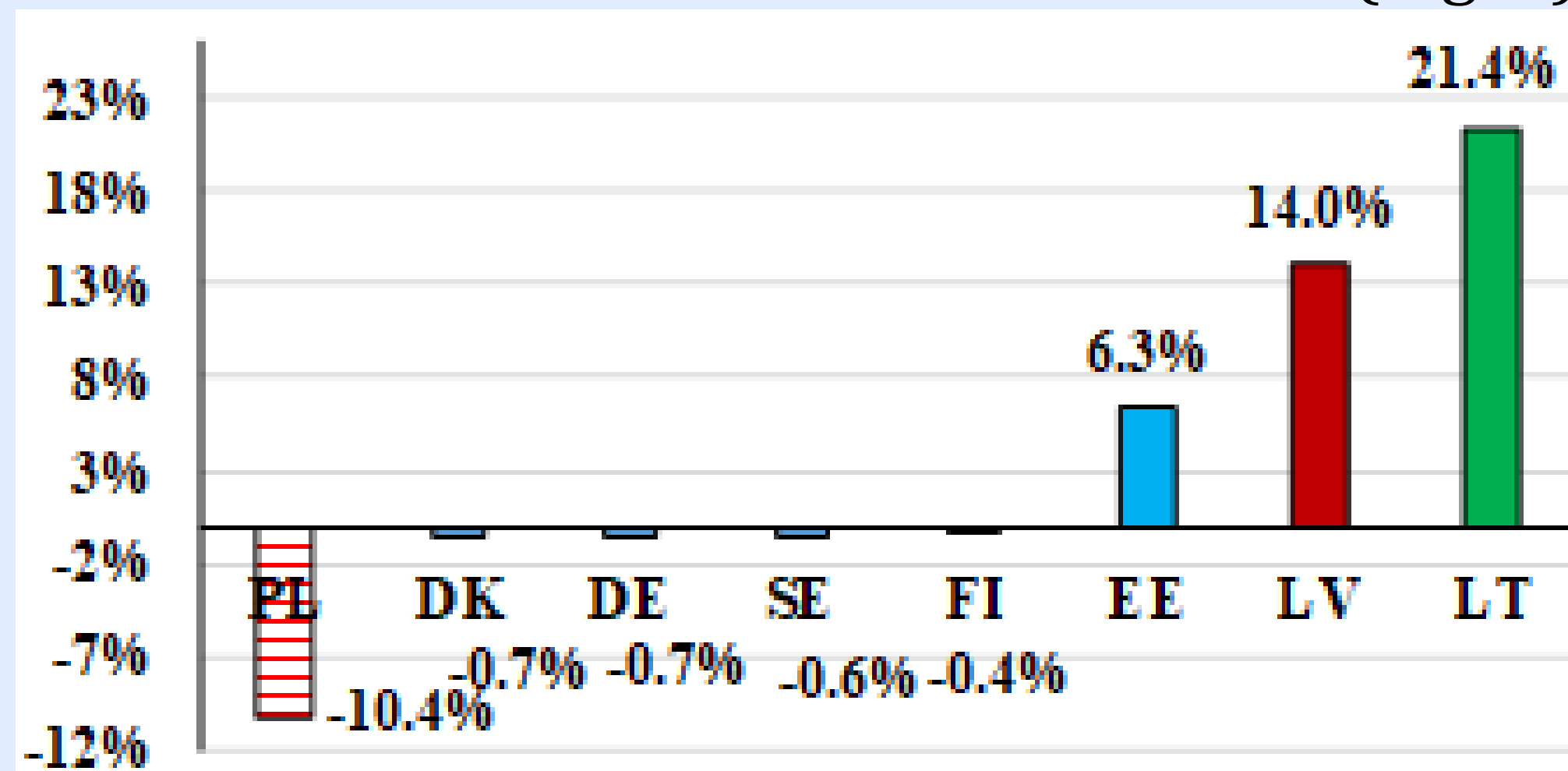


Fig. 1. The changes (2013/2007) of share of cereals' area from total arable land

### Tillage practices

Reduced tillage practices leave at least 30% plant residues on the soil surface for erosion control and moisture conservation. The area where the methods are used is insignificant and is located in higher economic size farms (Table 1), because requesting expensive agricultural machinery.

Table 1

The share of arable land cultivated with various tillage methods by farms of various economic size in Latvia, 2016

Tillage method	Total	Economic size class of farms, thou EUR						
		Under 3.9	4.0-14.9	15.0-24.9	25.0-49.9	50.0-99.9	100.0-499.9	500.0 & more
Conventional	91.2%	3.0%	6.9%	4.1%	8.0%	11.0%	33.7%	24.5%
Conservation	7.4%	0.0%	0.1%	0.0%	0.1%	0.5%	2.8%	3.8%
Zero	1.4%	0.0%	0.0%	0.0%	0.0%	0.1%	0.4%	0.8%

### Organic farming

Share of UAA under organic farming in Latvia is in the 6<sup>th</sup> place among EU countries, and in 3<sup>rd</sup> place (14%) among Baltic Sea countries (Fig. 2).

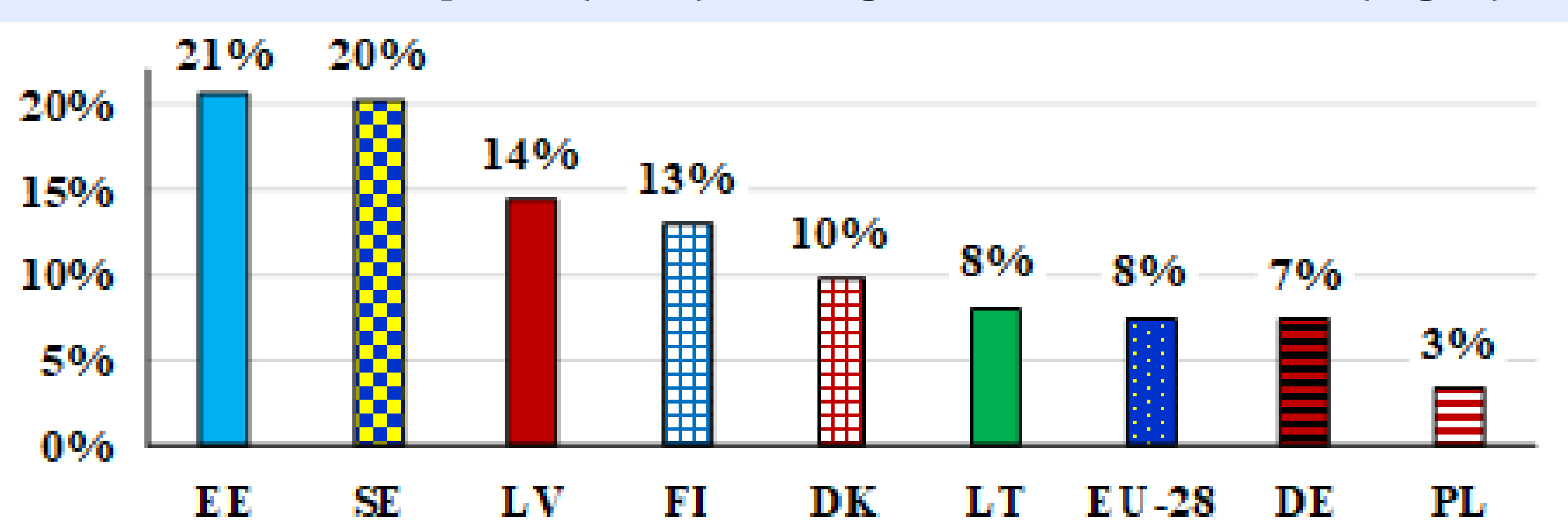


Fig. 2. The share of organic area from total UAA in the Baltic Sea countries, 2018

### Winter soil cover

The highest share of bare soil in winter period is in farms of higher economic size (Fig. 3).

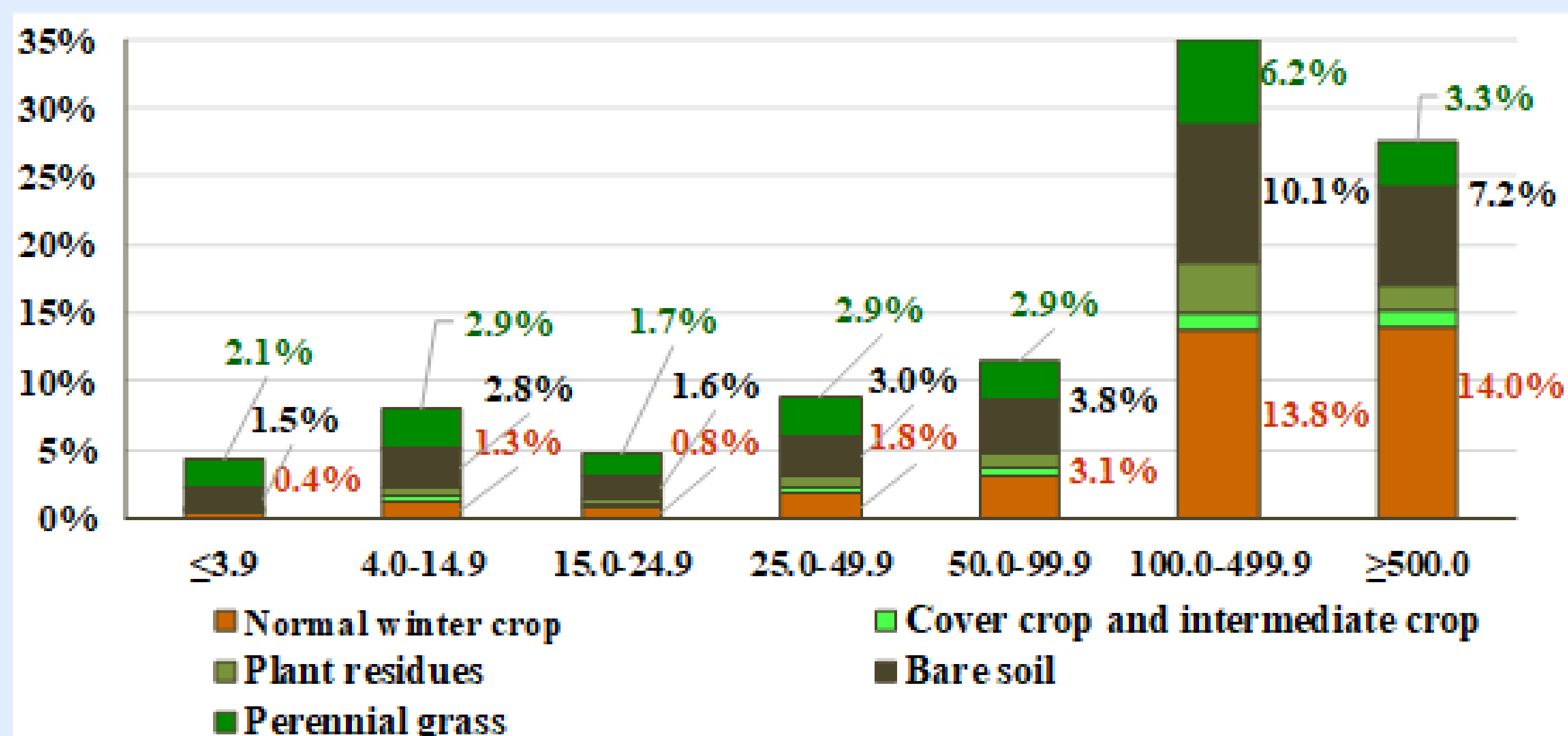


Fig. 3. The share of UAA with soil cover in winter by Latvia's various economic size farms, 2016

Carbon is one of the main components that constitutes fertile topsoil. Between 2009 and 2015, the topsoil organic carbon content in croplands has decreased significantly in Latvia (-15.0%).

### RDP support of farms

RDP 2014-2020 support devoted to agri-environmental & climate related measures is less in some positions in comparison to the Baltic Sea region countries, e.g., organic farming, Natura 2000 & water framework (Fig. 4). Moreover, Latvia's support as EUR per ha is the lowest among other Baltic Sea Region countries (Table 2).

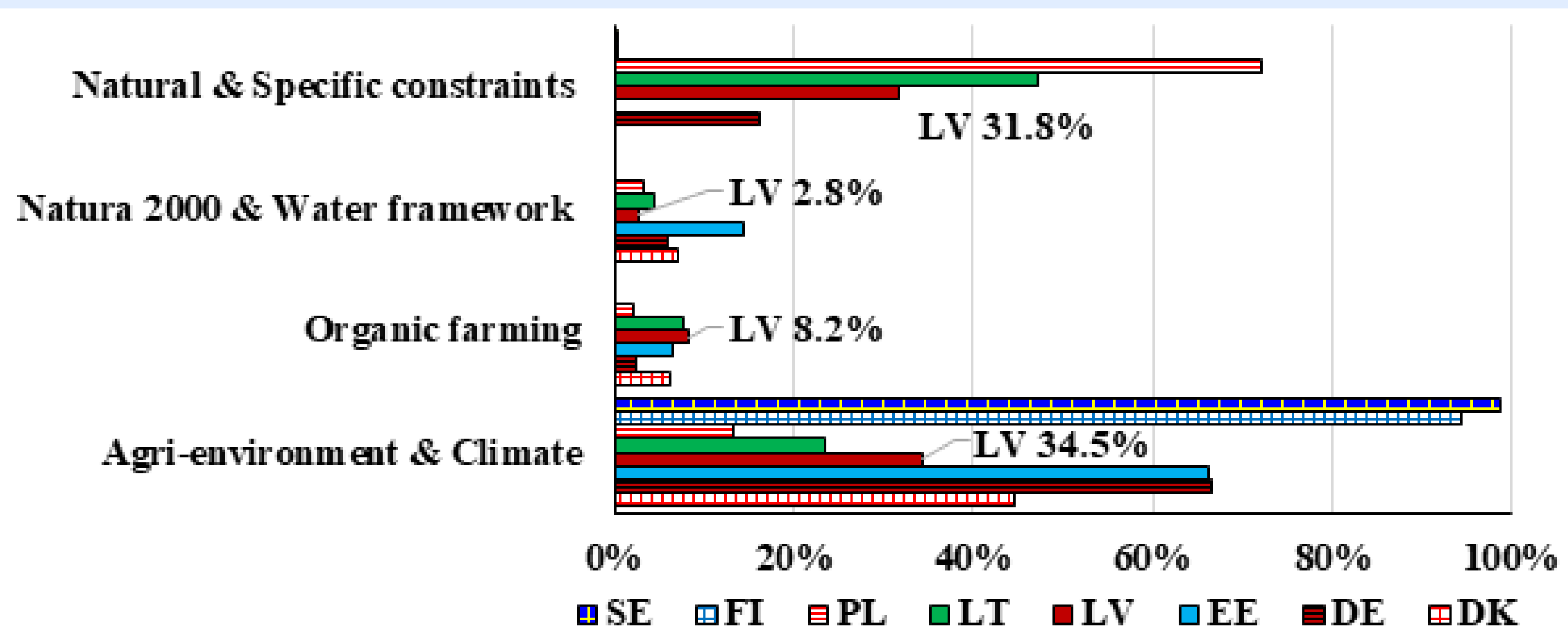


Fig. 4. The share of RDP 2014-2020 measures' support of in the Baltic Sea countries, 2016

Table 2

RDP 2014-2020 support (EUR/ha) for agri-environmental & climate related measures in Baltic Sea countries, 2016

	Agri-environment & climate	Organic farming	Natura 2000 & water framework	Natural & other constraints
DK	2692	2700	3074	n/d
DE	2454	1995	2304	2514
FI	1884	n/d	n/d	1757
SE	1838	17814	n/d	58624
PL	1489	1390	1051	1674
EE	859	508	607	n/d
LT	737	560	540	685
LV	636	474	376	610

## Conclusions

Mitigation and adaptation options & measures in Latvia's farms are not implemented sufficiently and effectively compared to other Baltic Sea Region EU countries.

One of the reasons could be that the most of measures are not profitable for farmers, but Latvia's farms receive the lowest agri-environment and climate related payments among the Baltic Sea Region EU countries, as well as among the Baltic States.

Since CAP (i.e., financial support) should contribute to climate targets, it is necessary to develop more precise rules and procedures for receiving green and agri-environment payments.

## ACKNOWLEDGEMENTS

The paper was partially supported by the project "Challenges and Solutions of Latvian State and Society in an International Framework - INTERFRAME-LV" (No VPP-IZM-2018/1-0005) within the National Research Program "Latvia's Heritage and Future Challenges for Sustainability of the State".