Promoting more resource efficient agricultural practices through climate smart farming - the LCAgri BioStrateg project outlook

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Examples of research projects in the area of bioeconomy in Poland

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LCAgri (2016-2019)
Support for low carbon agriculture - able to adapt to observed climate change in the perspective of 2030 and 2050 (LCAgri)

The main objective of the LCAgri project is to improve resources use efficiency by implementing innovative low carbon farming practices and promotion of sustainable use of mineral fertilizers by farms in Poland

Key words: CARBON FOOTPRINT, MITIGATION AND ADAPTATION TO CLIMATE CHANGE, MODELLING, GHG EMISSION, LOW CARBON FARMING
LCAgri – supports policy towards climate change adaptation in Poland

Strategic Plan for Adaptation to climate change in Poland proposed for agriculture (SPA 2013)

• Setting up local systems for monitoring and warning about approaching hazards in agriculture

• Organizational and technical changes in agriculture to avoid excessive losses by adjusting agricultural activities to the observed climate change

Use well what we don’t use yet

Use better what we already use

LCAgri – supports policy measures towards bioeconomy development
Sustainable intensification is the only way to reduce yield gap in Poland = proper soil and mineral fertilizers management

Average crop yields (t ha⁻¹) and yield gaps of rainfed wheat in Europe
Low carbon agricultural practices were tested in eight IUNG-PIB Experimental Farms (2016-2018)

LC2 – use of computer-based decision support systems in N application

LC8 – Conservation agriculture (strip-till, reduced-till, cover crops)

LC6 – leguminous crops

LC1 – 4R Nutrient Stewardship

LC9 – precision farming methods

(http://www.lcagri.iung.pl/en/)
Carbon footprint - production of N fertilizers evaluation for climate smart technology

Carbon Footprint labels for Grupa Azoty fertilizers products were prepared including advice for farmers for the proper use of those products.

energy

Natural gas → Ammonia
Sources of GHG emissions from maize cultivation in Poland (evaluation for 30 farms in Poland) (an example)

To think more „climate smart” about nutrient management

- Direct emissions from soil ($N_2O$)
- Not-direct emissions of N (to water)
- Production of N fertilizers
- Production of seeds
- Production of plant protection products
- Use of fuel

Source: Żyłowski T., Król A., Kozyra J., Ocena możliwości ograniczenia śladu węglowego w uprawie kukurydzy na ziarno, 2018, SERIA T.XX (4)
LCAgri – new measurement systems

11 young scientists trained, 2 utility patterns for GHG measurement
Decision maker

Option

Small farm | Big farm | According to agricultural experts

Direct sowing | 3 | 1 | 2

Reduced tillage | 2 | 2 | 3

Traditional ploughing | 1 | 3 | 1

Criteria considered are: (1) expected gross margin (2) standard deviation of gross margin, (3) fuel consumption (4) labour use in hours, (5) soil moisture and (6) organic matter in soil.
Learning by experience

Field discussion between scientist and farm manager where to locate experimental fields

Reduced tillage

Conservation agriculture
Strip-till
Osiny Experimental Farm - Learning by experience

Winter wheat after rape cultivation - Conservation agriculture (strip-till)

24-11-2016

Fot. dr Anna Nieróbca
Osiny Experimental Farm
Rape- Conservation agriculture (strip-till)

Fot. dr Anna Nieróbca

24-11-2016
Osiny Experimental Farm
Winter wheat - Conservation agriculture (strip-till)
Osiny Experimental Farm

Winter wheat after rape cultivation- Conservation agriculture (strip-till)

Fot. dr Anna Nieróbca

21-04-2017
Osiny Experimental Farm – YIELD LEVEL

Winter wheat after rape cultivation - Conservation agriculture (strip-till – LC8, reduced till – Std.)

WP5

Kępa/Osiny 1

LC8

6.6

Std.

6.6

Kępa/Osiny 2

5.8

6.1

0 1 2 3 4 5 6 7

t/ha

Fot. dr Anna Nieróbca

25-06-2017
Osiny Experimental Farm – PRODUCTION COST (2017)
Winter wheat after rape cultivation- Conservation agriculture (strip-till – LC8, reduced till – Std.)

WP5

PLN/ha

Kępa/Osiny 1

2071

2115

Kępa/Osiny 2

1976

2221

Fot. dr Anna Nieróbca

25-06-2017
Osiny Experimental Farm – MACHINE WORK HOURS (2017)
Winter wheat after rape cultivation- Conservation agriculture (strip-till – LC8, reduced till – Std.)

Kępa/Osiny 1

Kępa/Osiny 2

25-06-2017
Osiny Experimental Farm – USE of FUEL (2017)

Winter wheat after rape cultivation - Conservation agriculture (strip-till – LC8, reduced till – Std.)

WP5

Kępa/Osiny 1

Kępa/Osiny 2

fuel/ha

43,6

69,2

53,6

70,5

LC8

Std.

Fot. dr Anna Nieróbca
Networking

WP6

1166 participants in field LCAgri days and workshops