OptAKlim – Optimizing agricultural cropping strategies and measures for climate adaptation

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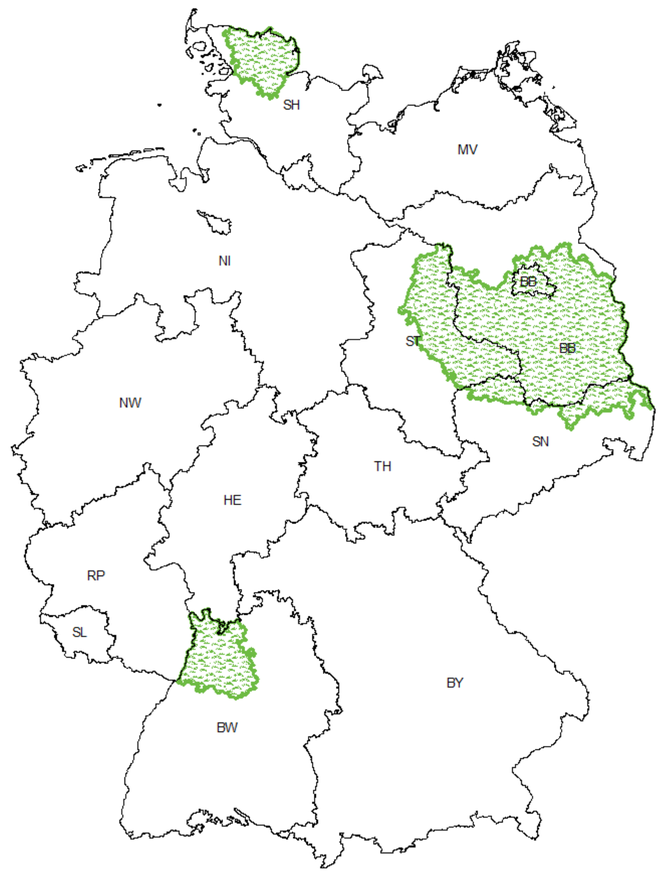


Figure 1: Model regions: North (Rendsburg-Eckernfoerde, Schleswig-Flensburg); East (Teltow-Flaeming, Potsdam-Mittelmark); Southwest (Heilbronn/Karlsruhe) ©Strassemeyer

OptAKlim (11/2018 – 10/2021) –project aims :

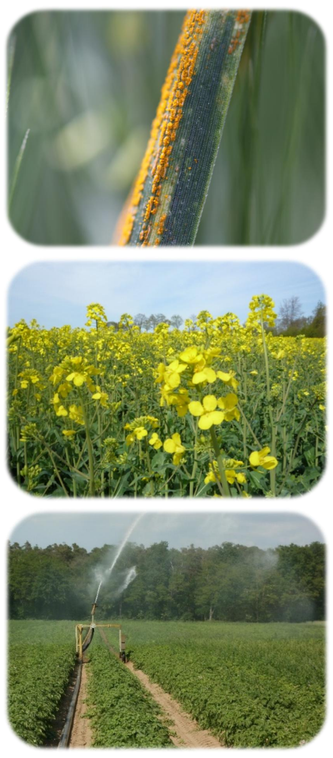
- advancement of agricultural cropping strategies and measures for **climate change adaptation,** for stregthening the competitiveness of agriculture and contribution to **better ecosystem services** including the **reduction of GHG emissions**, considering**:**
  a) i**nteractions** between climate change and plant protection, agricultural productivity and changes within the cropping structure
  b) **trade-off's** between climate change adaptation/mitigation and enviromental targets
- developing a web-based information and advisory tool for farmers (SYNOPS-Web+)

Work steps:

1.) analysing the **impact of climate change** on agricultural cropping systems (current climate & different future climate scenarios Tab. 1), particularly with regard to economics, productivity & plant protection, on regional scale in 3 Model regions: North, East, Southwest (Fig. 1)

Tab. 1: Future Climate Scenarios (PIK)

Model regions	**East**	**North**	**Southwest**
Future Climate Var. 1: Climate protection Scenario			
Spring precipitation (**mm**)	+4 (-15 to +16)	+ 6 (-20 to +23)	+9 (-11 to +30)
Drought (**days**)	+3 (-4 to +9)	+2 (-5 to +8)	+2 (-4 to +8)
Heat (**days)**	+4 (+2 to +8)	+1 (+0 to +2)	+5 (+2 to +9)
Future Climate Var. 2: „Business as usual" Scenario			
Spring precipitation (**mm**)	+ 23 (+10 to 36)	+ 31 (+10 to +53)	+27(+4 to +56)
Drought (**days**)	+5 (-6 to +13)	+4 (-5 to +8)	+10 (-6 to +21)
Heat (**days)**	+11 (+17 to +26)	+4 (+2 to +7)	+24 (+15 to +35)
Winter precipitation	↑	↑	↑
Summer precipitation	↗	-	↘
Generalized temperature	↑	↑	↑
Extreme precipitation	↗	↗	↗



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Impact on plant protection strategies:

- **epidemiology** e.g. population dynamics, geographical distribution, **thermophile pests↑** concerning: fungal diseases (*Puccinia* spp., *Fusarium* spp.), Aphids (e.g. *Sitobion avenae*), Cereal leaf beetle (*Oulema melanopus*, *O. lichenis* Voet), European corn borer (*Ostrinia nubilalis),* Western corn rootworm (*Diabrotica virgifera),* several oilseed rape pests (e.g. cabbage stem flea beetle, *Meligethes aeneus)*
- **Pesticide use**: efficacy↓, duration of effect↓, changing enviromental behavior and toxic potential etc.

2.) Workshops & dialog groups per model region:
In **cooperation with farmers and experts** we adjust the adaptation and mitigation measures to specific, **regional key problems and trade-offs**, both ecologically and economically.

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3.) Systematic **state of the art analysis** (literature review) of **trade-offs** between climate adaptation measures and enviromental effects, e.g. sown wildflower strips in maize (Fig.2) → improving the biodiversity impact (Tab. 2), reducing the GHGs by using the Strip-Till cultivator in maize (Fig. 3).

Figure 2: wildflower stripes in maize,©ZALF

Tab. 2: Wildflower stripes in maize: impact on biodiversity (ZALF)

	Impact on			
Climate adaptation measure	**Soil**	**Water**	**Air**	**Biodiversity**
	-Erosion - SOM - etc.	-Nutrient leaching -etc.	- GHG	-Breeding bird index - etc.

Figure 3: Strip-till cultivator in maize, ©ZALF

4.) **Stakeholder advisory board** at supra regional scale: **corporative development of climate friendly cropping systems** with stakeholders, to assess the practicability as well as to develop a web-based information and advisory tool for farmes (SYNOPS-Web+)

5.) **Resulting optimizing cropping variants will be tested exemplarily for feasibility**, Integration into the web based extension tool
→ SYNOPS-Web+

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