UAV’s for spraying in Agriculture in Europe

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Content

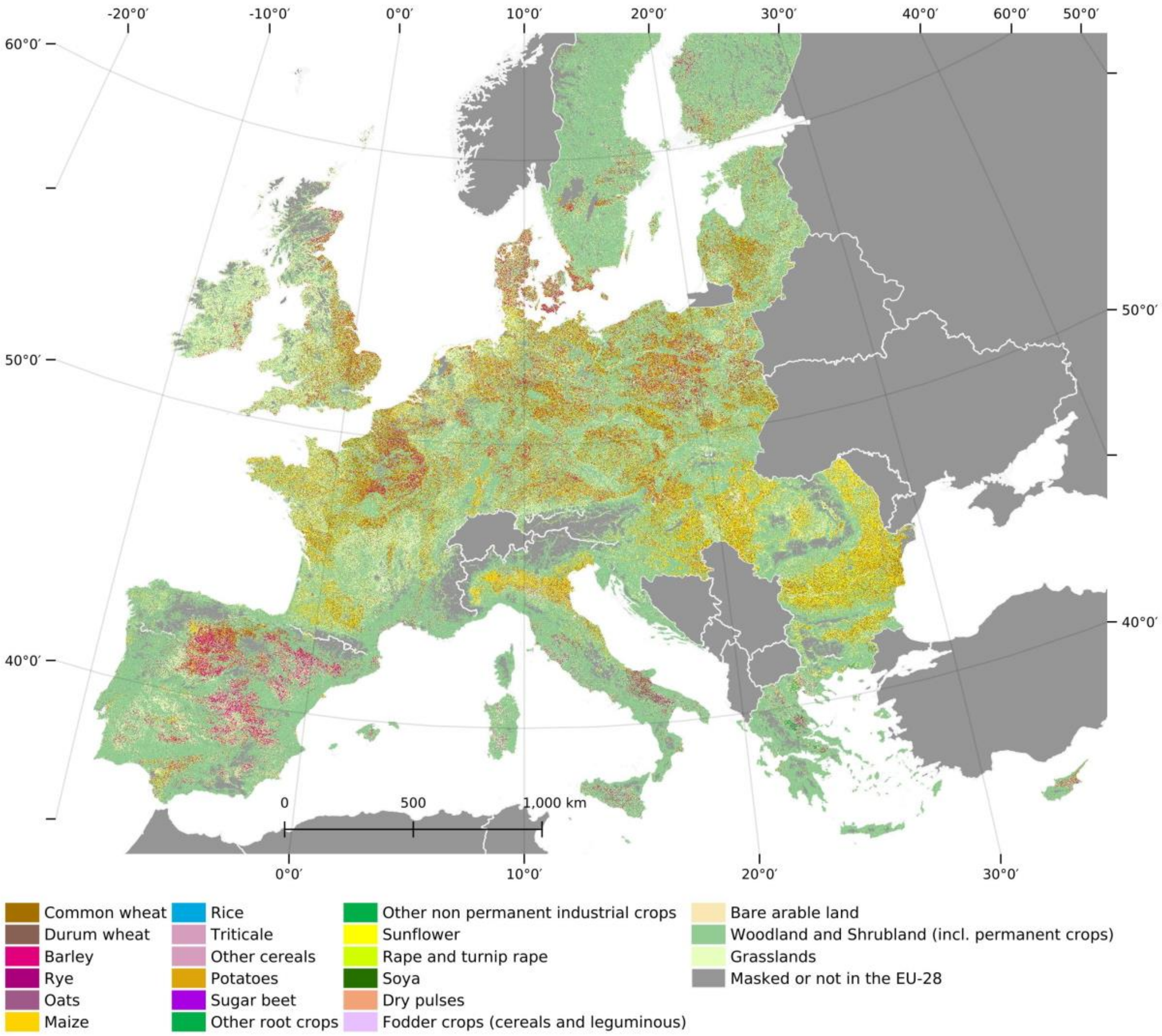
- European Agriculture
- Variety of Agricultural Crop Systems
- The use of drones in agriculture, pro’s and cons
- Road blocks to the use of spray drones
- Road forward

European agriculture

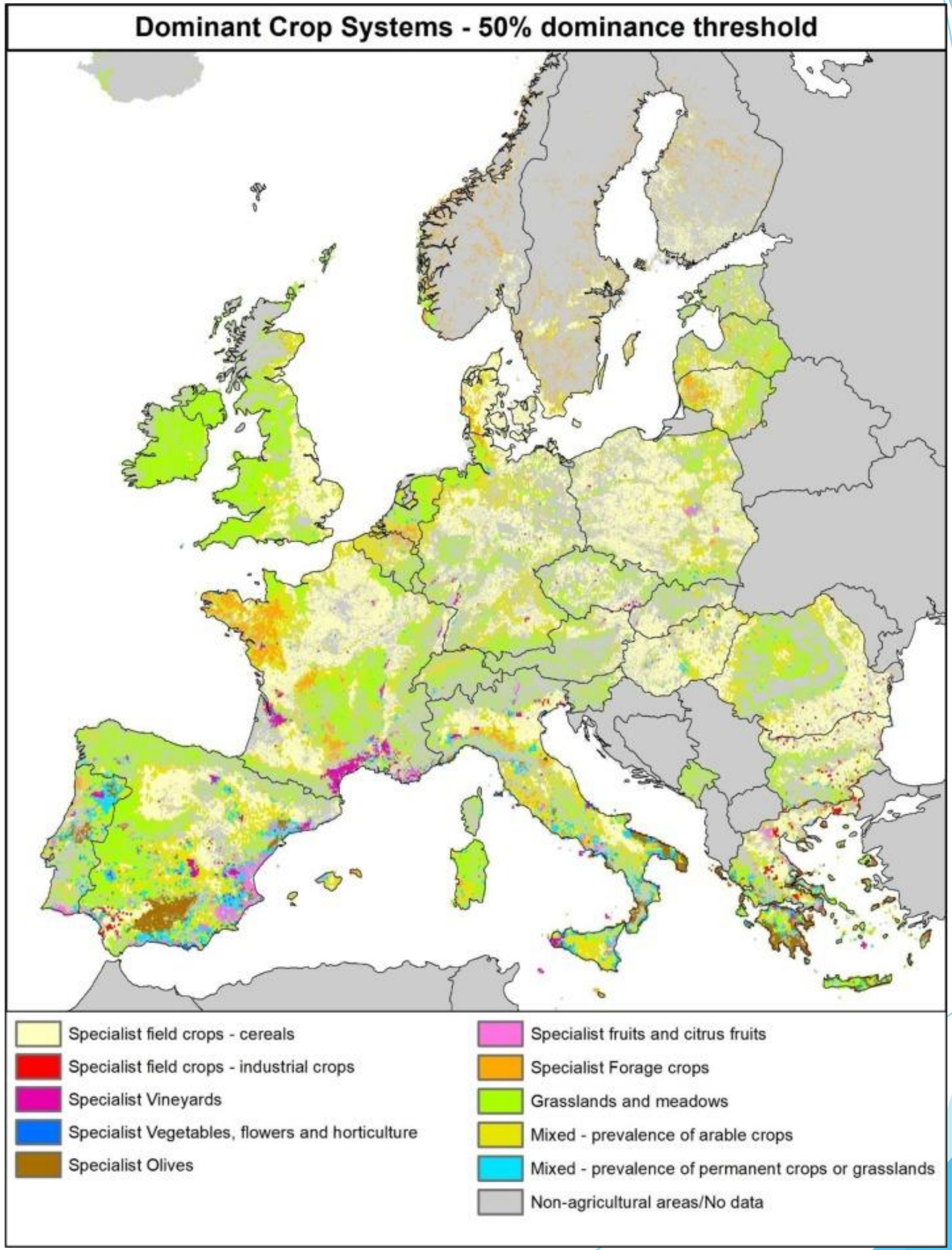
Variety of agricultural systems

- In crops
- In intensity of production in agriculture
- In land surfaces
- In climate and climate change consequences

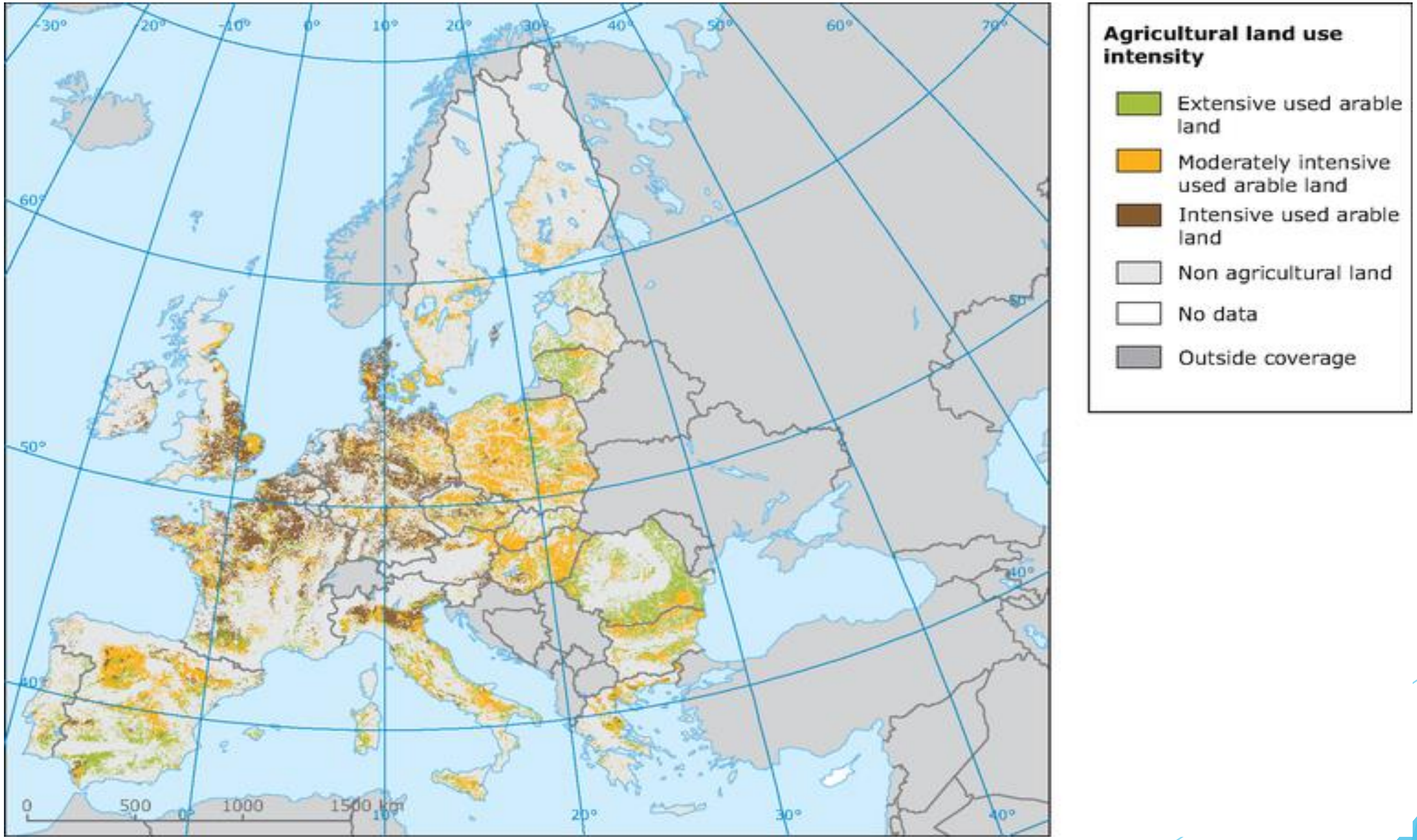
Variety of crops



Dominant crops



Agricultural intensity

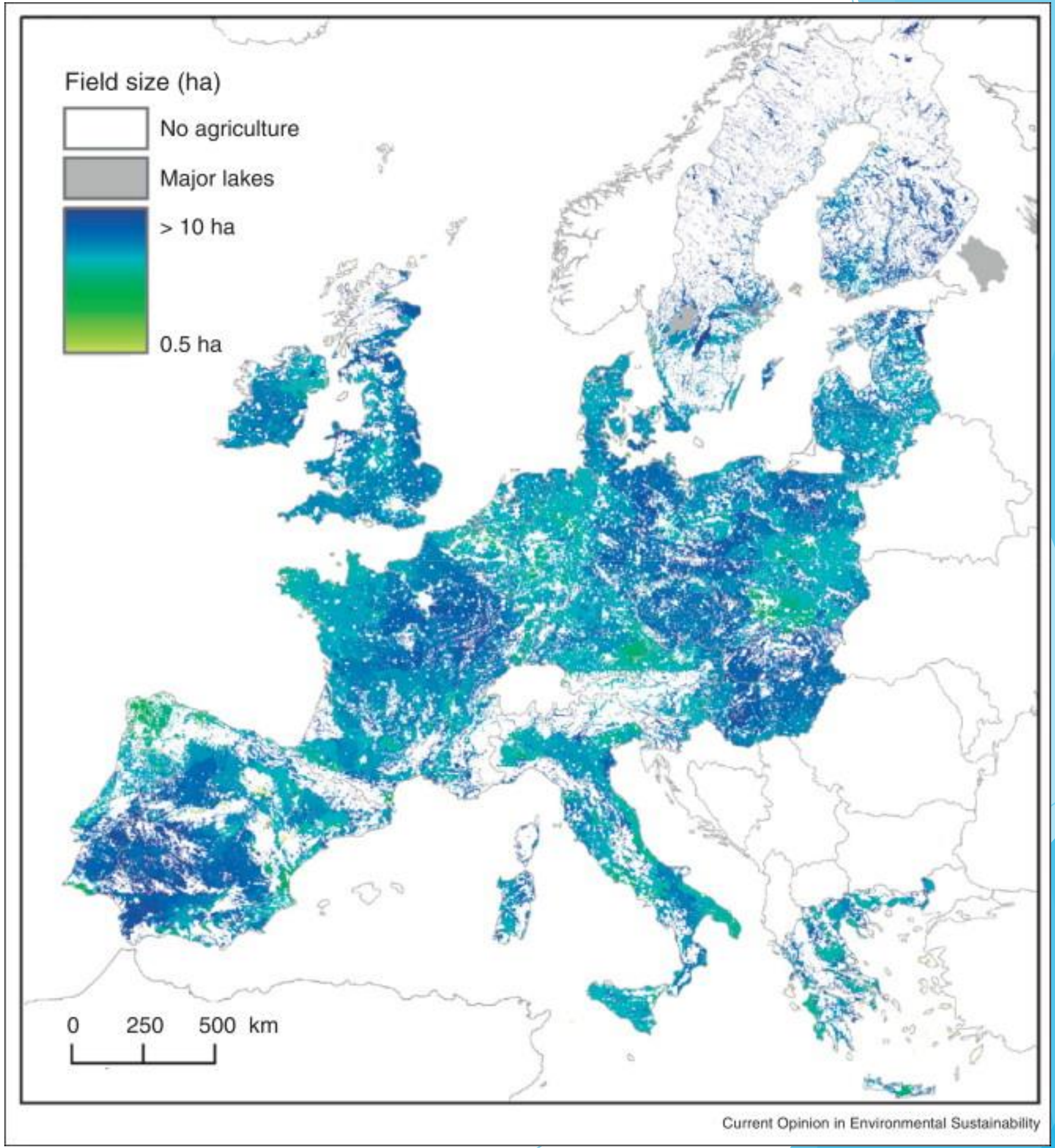


Production areas of farmers:

source https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Farms_and_farmland_in_the_European_Union_-_statistics

- There were 10.5 million agricultural holdings in the EU in 2016, two-thirds of which were less than 5 ha in size.
- EU farms used 173 million hectares of land for agricultural production in 2016, 39 % of the total land area of the EU.
- The number of farms in the EU has been in steep decline, but the amount of land used for production has remained steady.

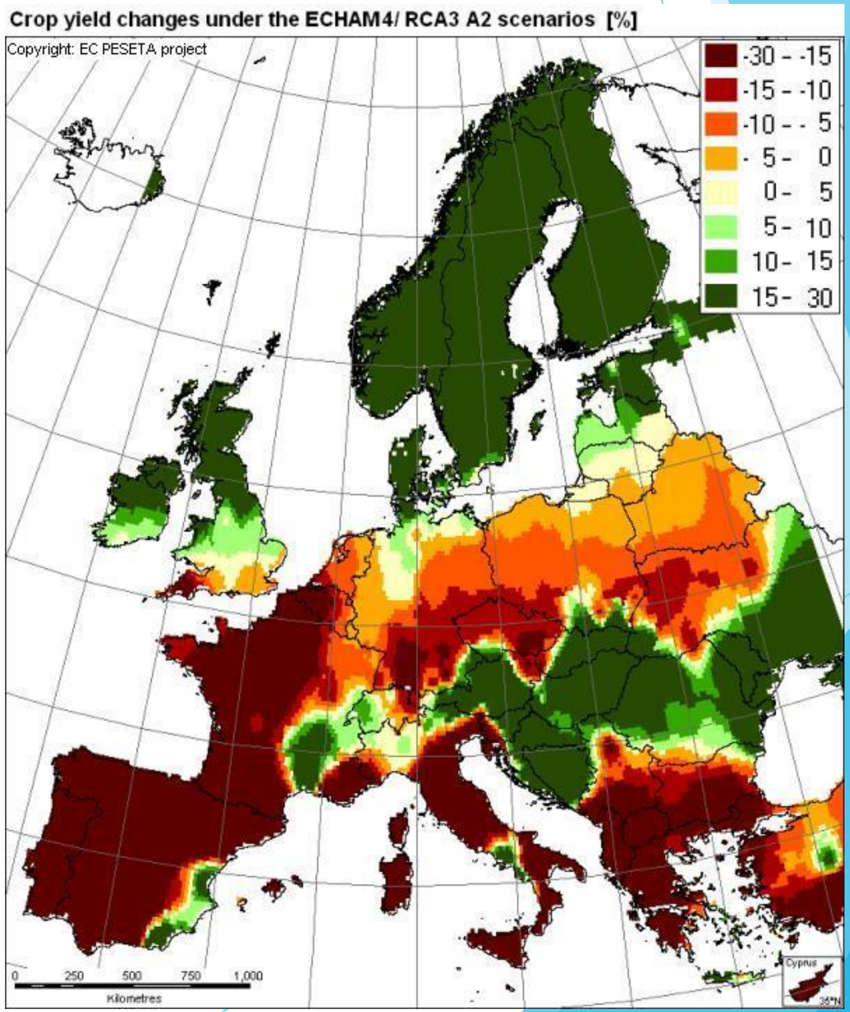
Field sizes



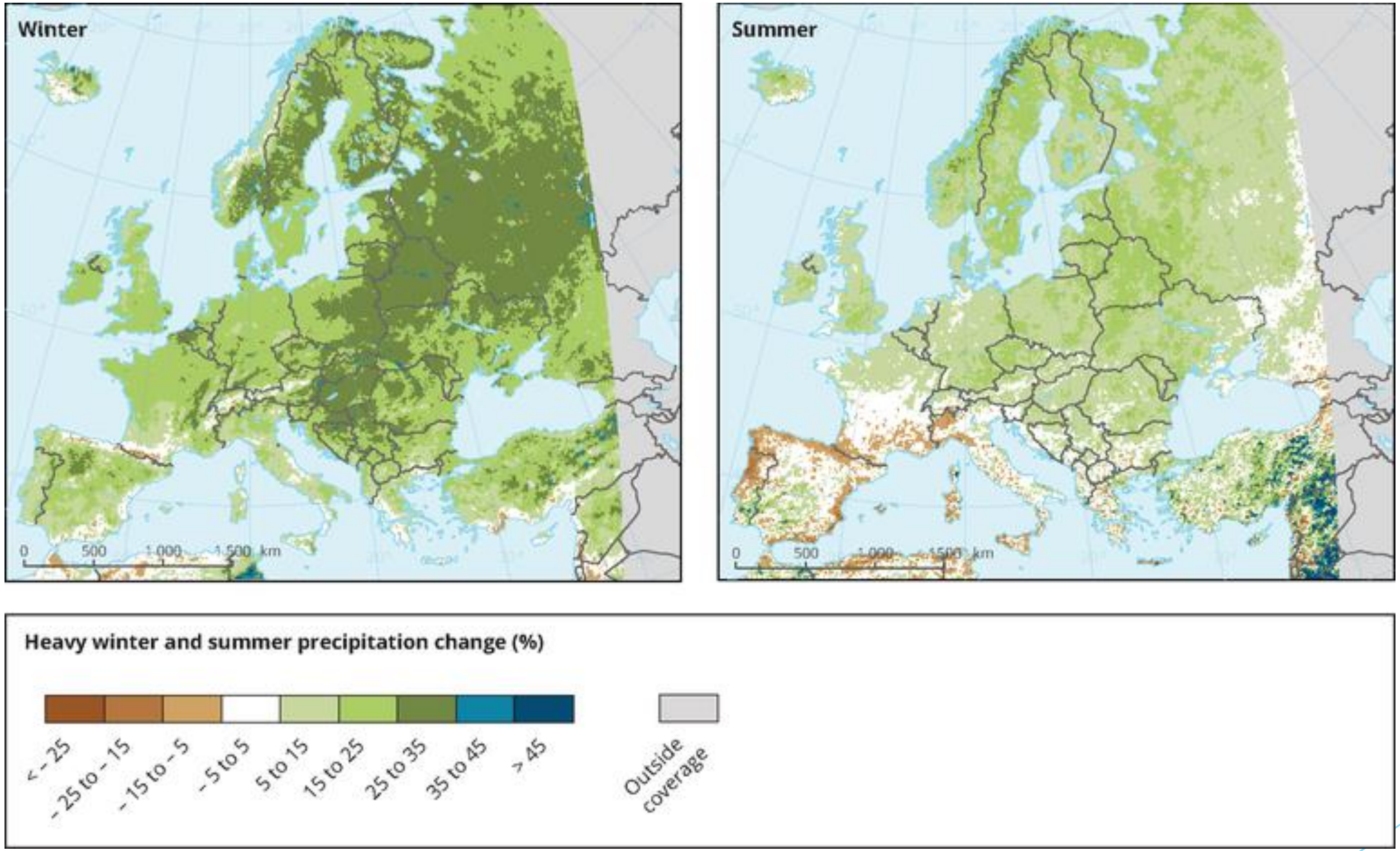
Field size (ha)
No agriculture
Major lakes
> 10 ha
0.5 ha
0
250
500 km
Current Opinion in Environmental Sustainability

Climate change effects in Europe

Source
https://ec.europa.eu/jrc/sites/default/files/peseta1_agri2_cyc_ECHAM4-RCA3-A2.jpg



Expected Changes in heavy rains due to climate change Source:https://www.eea.europa.eu/data-and-maps/figures/projected-changes-in-20-year-2



The potential of UAV spraying

Based on the agricultural field size and crops and farming production intensity, there seems to be a wide scope for agricultural spraying drones:

The potential can be divided in short term mid term and long term, and low hanging fruit and high hanging fruits.

- The low hanging: where other type spraying is quite expensive due to : hilly terrain (where field sprayboоms widths are limited) or wet crops (like rice); or easily saturated soils
- The low hanging: where intensive crops are grown, that need spraying swiftly to avoid spreading of the plagues.
- The low hanging: where the crops provide good return so that the farmer can invest!

Pro’s and cons of spraying with drones

Pro’s

- Allows spraying, when soils are still wet and tractor spraying is spoiling soil structure (rain downpours will
- Allows automatic spraying in hilly or steep land, or wet land
- Spraying can be programmed in advance and min pilot skills needed
- Can be faster as manual or tractor boom spraying (8 to 30 ha per hour
- Spraying is cheap as compared to alternatives (15 to 20 Euro/ha)
- Spraying pattern independent of rows, eg. to include wind drift

Con’s

- No spraying with wind > 3 m/s
- Spraying is normally from top to bottom, not side ways, although that can be arranged too
- Drone spraying needs planning and new knowledge to optimize spray volumes per ha
- Spray drones require a new infrastructure for servicing

Markets in the Netherlands crop farming

- There is always a group of farmers willing to test new technologies
- This group is normally a small percentage of the total. When we would have 8.430 crop farmers in the Netherlands and we aim for **1%** of them having the interest to use spraying, it is making up for ca **84** farmers. With the total area of ca 528.660 ha and an average size of 62 ha that would be a short term potential
- With 25 ha per hour a drone could do 200 ha in a day. So a contractor could in a week service **1000 ha** or 16 crop farmers of average size so ultimately the **one percent** of innovative farmers need ca **5 to 6 drones** with such capacity!

Markets in EU

- The markets in the EU can be attractive for drone spraying services. And the start in low hanging fruit crops and farms (eg wet rice cultivation, vineyards, steep hilly areas easy water stagnation areas) can make it a business! The costs of drone spraying are competitive to most of the methods used in those type of conditions.
- Info on market sizes and predictions can be a good business There are interesting reports on this: source:
- https://www.marketandresearch.biz/report/121652/global-crop-spraying-drone-market-growth-2020-2025

Markets world wide agridrone market

- China: 40 to 50.000 currently used (2022)
- USA **Agriculture Drone Market Worth USD 3,697.4 Million by 2027**

Road blocks for Spraying Drones

The road blocks are quite similar to any new disruptive technology:

- Not familiar to the farmer
- Not familiar to agri contractors (spray services)
- Legal flying requirements not clear to operators
- High requirements for spraying and wind drift

Familiarity to farmers

- Using a spray boom tractor is what the farmer understands, a drone is a **robotic system** that seems quite difficult to master: there are also no data on type of sprays and concentrations that can be used. The official suppliers as Bayer, do not provide info either! There are some data from Chinese agro chem companies (https://news.agropages.com/News/NewsDetail---35499.htm)
- The next issue is a drone or UAV requires some **basic understanding of software**, that today's farmers also master, but it feels to them even more risky
- Solution: field demonstrations for farmers, websites with suitable info for spraying type & dosage, training

Not familiar to agri contractors (spray services)

- The current contractors business is providing services with spray boom tractors or specialized equipment or even aerial spraying with planes or helicopters,
- Familiarity is not with the drones spraying, but this might be overcome swiftly once the benefits are shown to them in terms of lower costs and better applicability (also after extreme rains eg).
- Solution: field demonstrations for farmers, websites with suitable info for spraying type & dosage, training

Legal flying requirements not clear to operators

- The pro’s of the EU are in the **making of a large market**, the con’s in the speed on **generally accepted rules for new technologies**
- No farmer or agri contractor will invest in a spray drone as long as the legislation is not clear: How high can you fly, can you fly on your own land only, can you spray with chemical or only biological spray means?
- In the spray drone working group of the EU, one is only discussing the drones <25 kg MTOW, the discussion on larger spray drones has not even started
- However the more east in Europe you go the less people are bothered with EU regulations; so there are a number of countries that are now engaging in spray drones (personal observation). However it is also difficult to get the info on the market there: we know that most applications are using herbicides for land preparation.

Thank you for listening

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