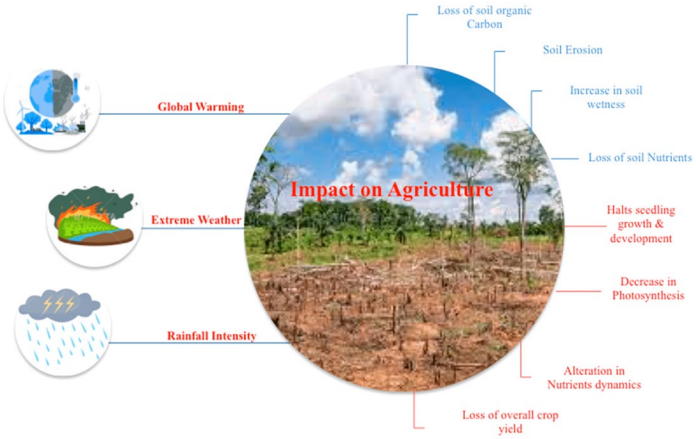
Agriculture and Climate change

Climate change has dramatic repercussions on food production and its related supply chain. These changes can lead to reduced crop yields, lower nutritional content, and increased vulnerability to pests and diseases while also disrupting planting and harvesting cycles. Yet, the repercussions of climate change extend far beyond crop production.



Extreme weather events disrupt the entire food supply chain, resulting in food losses, price fluctuations, and reduced access to nutritious food. These consequences disproportionately affect vulnerable populations, particularly in developing nations.

Desertification, accelerated by climate change, leads to the depletion of fertile soil and exacerbates climate-induced water scarcity in regions across the globe. Rapid population growth amplifies the pressure on agricultural systems, leading to overexploitation of resources. Immediate action is crucial for a better future: sustainable agriculture, investment in climate-resilient technologies, and promotion of international cooperation are all necessary steps to achieve higher food security.

Physical Risks	Droughts and heat stress	Heatwaves and droughts can threaten livestock and feed supplies as well as causing changes in crop production, resulting in higher costs and agriculture loss.
	Extreme storms and flooding	Extreme storms and flooding can reduce the production and quality of feed grain, pastures, and crops. Such events can reduce the supply and quality of crops and livestock.
	Sea level rise	Sea level rises can impact biodiversity, decrease soil quality, induce more flooding, and increase saltwater intrusion and soil salinisation, causing production to fall and negatively impacting income and food security.
	Wildfires	Increased severity and frequency of wildfires can damage crops and livestock, resulting in losses for the forestry industry and infrastructure. Wildfires also create hazardous working environments for outdoor workers.
	Ocean acidification	Climate change is rapidly increasing the acidity of oceans. Rapid ocean acidification severely threatens marine biodiversity.
	Invasive species	Invasive species can reduce the resilience of agricultural systems and are one of the biggest drivers of biodiversity loss. The increased spread of invasive species can affect food security and livelihoods.

At DeepPlants, we are at the forefront of transformative solutions.
Vertical farming, a revolutionary method involving vertically stacked crops, maximizes land use efficiency, reduces water consumption, and minimizes pesticide use. Thanks to their highly controlled conditions, Vertical Farms can achieve high, consistent, and year-round crop productivity, independent of climate conditions or arable land availability, therefore avoiding weather-related shocks that impede suppliers' ability to offer produce whenever and wherever required. This is particularly beneficial for natural habitats and biodiversity conservation thanks to the reduced need to clear large areas of land for farming. Moreover, vertical farms can be set up in urban environments, providing fresh, locally grown produce to city dwellers, decreasing the need for long transportation routes, leading to fresher products and lower carbon emissions. Vision-based analysis of crops and deep learning-based predictions are essential components for monitoring plant growth behaviour. For example, phenotypical and phenological data can help deep learning systems to accurately identify and track different growth stages of crops.

Our products help farmers make informed decisions about irrigation, fertilization, and pest control, as well as enhancing their understanding of plant biology, and assisting in crop breeding. Our software, capable of automatically detecting plant stress, enables real-time adjustments of growing recipes, provides optimal growing conditions, and promotes efficient resource use of Vertical Farms.

Vision-based deep learning models have groundbreaking potential across various agricultural sectors. These models can be deployed in traditional outdoor farming to enable precision agriculture practices. Drones equipped with cameras and deep learning algorithms can capture high-resolution images of large farmlands, assisting farmers in identifying crop stress, pests, and nutrient deficiencies. This information guides the precise application of water and fertilizers, reducing wastage and enhancing yields. By analyzing visual cues such as crop maturity and quality, businesses can also plan harvest schedules and distribution routes, minimizing wastage and maximizing profitability. Differentiating between crops and weeds facilitates robotic systems to autonomously remove weeds without harming the main crops. This removes the need for herbicides and manual labour, making weed management more efficient and environmentally friendly.

We are building a dataset for plants huge enough to be used for supervised and unsupervised classification and segmentation.
A small portion of it, with the contribution of Agricola Moderna https://agricolamoderna.com/ is on HuggingFace https://huggingface.co/datasets/deep-plants/AGM

Our software is on Github.