# Future Weather and Adaptation of Farming Practices

## Dr. Elodie Ruelle

Teagasc, Moorepark Animal & Grassland Research and Innovation Centre, Fermoy, Co. Cork

**Summary**

- Weather in Ireland is changing, climate projection are showing a steady increase of temperature across the year, with an increase of winter and spring rainfall.
- While an increase of the recurrence of summer drought is forecasted, the increase of the variability between years will be one of the biggest challenges for Irish farmer in the future.
- For crops, an increase in temperature could lead to new opportunities and increased yield. However, trafficability and increased pest risk are forecasted to be the biggest challenge.
- For grassland, overall annual grass yield is predicted to slowly increase. But the seasonality of the growth will change with an increase in the winter and spring months and a decrease, due to water deficit and increase temperature, in the summer and autumn months, with a big year to year variability.
- Better farm infrastructure, appropriate stocking rate and sufficient good quality forage stocks will be necessary to properly adapt to future climate.

**Introduction**

For the last decade, Irish research has been focussing on ways to reduce its emission and impact on the environment (mitigation). The change in weather due to climate change is starting to be more visible on farm, as the summer of 2018 or the spring of 2024 are showing. Hence, highlighting the necessity for adaptation strategies to be developed. However, in order to be able to adapt to the future challenges and find relevant adaptation strategies it is important to know what will be the likely impact of future climate on the current systems. This paper will present the likely impact of future climate on the Irish grazing system as well as presenting some of the main challenges and possible solution for the grassland and crops sectors. In this work the data from the TRANSLATE (O'Brien et al, 2024) project from Met Éireann has been used. In a very brief summary, climate projection are showing a steady increase in temperature across the year, with an increase of winter and spring rainfall and a possible decrease of summer rainfall, with higher variability between years.

**Future grass growth**

Using data from the TRANSLATE project, a modelling exercise has been conducted to predict the impact of climate change on Irish grass growth (Ruelle, 2024). Overall, the prediction for both the 1.5 °C and 3 °C global warming show an increase in annual grass yield for every part of Ireland. However, when looking at the seasonal changes (Figure 1), the story is not as good as most of the increase in grass growth comes from an increase during the winter and spring month. The grass growth is predicted to decrease in the month of July, August and September for the midlands and east coast (the more easterly, the higher the decrease). The trend of change will increase, when going from the 1.5 °C to the 3 °C global warming.

When looking at the variability between years at a specific location (Moorepark), the main change was for the month of April where higher variation was seen (but looking mainly like an increase in growth). For the month of August, where the yearly variability had increased, with many more years with poor grass growth during this summer month. However, this decrease was not statistically significantly showing that the average year will probably be similar to that currently but, the occurrence of a summer similar to 2018 will increase.
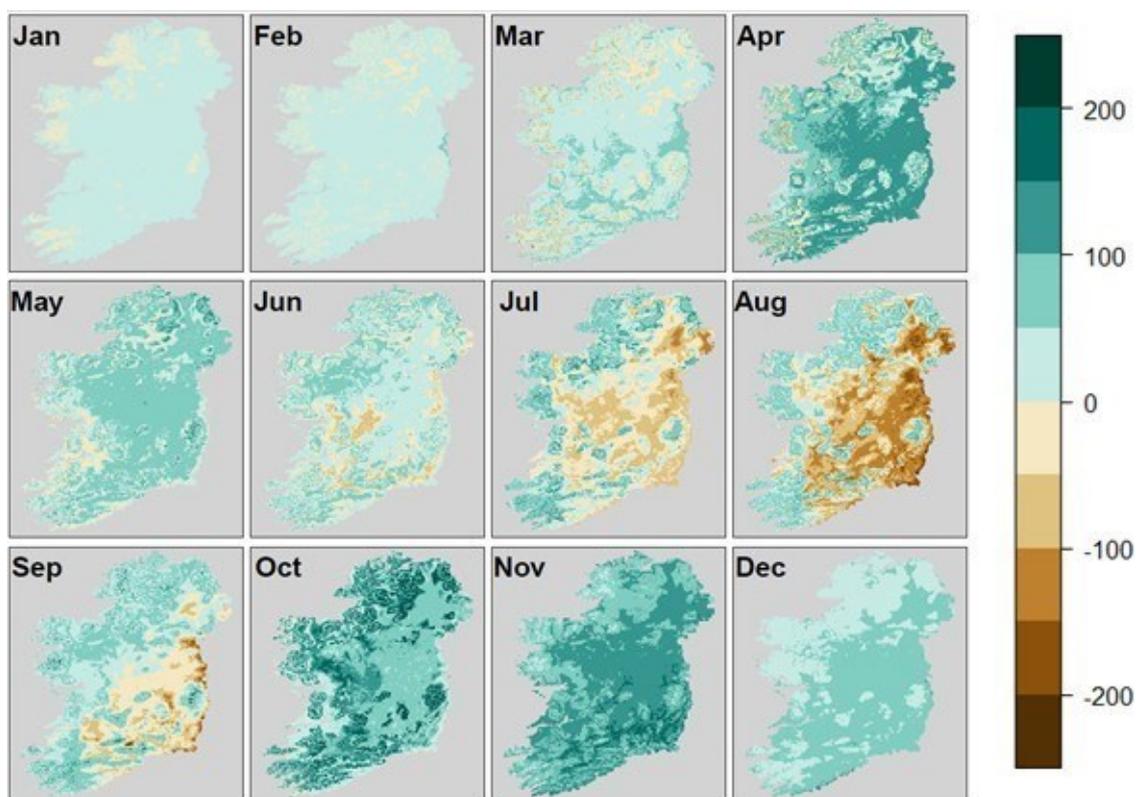
Figure 1: Monthly cumulative grass growth difference between a 1.5 °C warming simulation and the baseline simulation (1976-2005)

**Grassland adaptation - What does those forecasted changes means?**

While the increase in growth in the winter looks positive, trafficability might be a challenge. It may not be possible to take advantage of the increase in growth in the spring months, through increased grass utilisation, if soil conditions restrict grazing. On-farm grazing infrastructure will have to be improved to ensure good access to paddocks early in the year, especially if the increase of spring growth is also associated with an increase in rainfall. On the other hand, the decrease in growth in the summer, combined with an important increase in the variability during the months of July to September will lead to increased challenges for summer and autumn grass management. This could have repercussions and cause difficulty in creating adequate forage stocks for winter feeding. However the projected increase in growth for the months of October and November could help extend grazing (weather conditions permitting) and reach target closing and opening farm covers. Some extreme years will be associated with very poor or even no growth in some of the summer months. Those years, while rare, will become more frequent in the future. Farmers will need to increase their silage and forage stocks to ensure adequate buffer feed is available during those periods. It will also be important that the forage is of high quality to maintain milk yields.

The switch to more diverse sward or more drought resistant grass could also help in the adaptation to drier summers. The decision support tools such as PastureBase Ireland and grass growth prediction will be an asset to farmers, allowing them to better anticipate the fluctuations and take early action.

However, one of the main factor which will be impacting the resilience of farms is the stocking rate. Having the right number of animals, depending of the grass growth potential of the farm, taking into account management and soil type will be vital. Having too many animals reduce the flexibility of the system.

**Crops adaptation**

In term of crops, the same modelling exercises is currently ongoing but early results aren't yet available. Nonetheless some hypothesis can be done, in term of yield. The likeliness is that overall yield, especially of winter crops, should increase due to increase in over winter growth due to warmer weather. Also there is the possibility that new cultivars such as soybean and sunflower will be suitable for future Irish climate.

On the negative side, the forecasted increase of rainfall in winter and spring and, the higher variability between years of that rainfall, will make the weeks where sowing and harvesting are possible more limited, because of trafficability. Having a bigger crop diversification pool will help. For example incorporating rye in the rotation. Rye can be planted from mid-September and will increase the window for both planting and harvesting, increasing the flexibility on-farm and so the resilience.

A decision support tool will be developed in the near future to predict farm and field specific crop optimal harvesting and sowing window related to farm location (weather) and soil type based on previous year data. This will help farmers in selecting and planning the best crop rotations to ensure the resilience of the farm. This will also be looked at with a future climate point of view.

With milder winter, there is a forecasted increase in the propagation of pest and diseases. One of the most detrimental viruses is the barley yellow dwarf virus propagated by an aphid. The increase of temperature and especially, winter temperature could be both favourable for the aphid reproduction and survival as well as virus replication within the plant. Research is currently ongoing to predict the best timing of insecticide spraying in the current climate as well as predict the aphid and virus pressure in future climate. The objective will be to create warning messages similar from the blight warning.

## Acknowledgements

## References

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