Scotland's Plant Health Conference - 28th May 2019
DoubleTree by Hilton Hotel, Edinburgh Airport, EH28 8LL

Climate Change Briefing and Discussion

HTA

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Agriculture

Sector lead: Professor Fiona Burnett
Scotland's Rural College (SRUC)

Climex modelling: Dr Andy Evans, Applied Practice Lead SRUC

Example pests where climate predictions affect risk

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- Invasive species with limited overlap with current climate – Colorado beetle, Spotted wing drosophila
- Endemic species with wide climatic envelop (clubroot)
- Emerging pathogen where risk is strongly linked to crop growth stage coinciding with conducive weather (Fusarium spp.)

Colorado beetle

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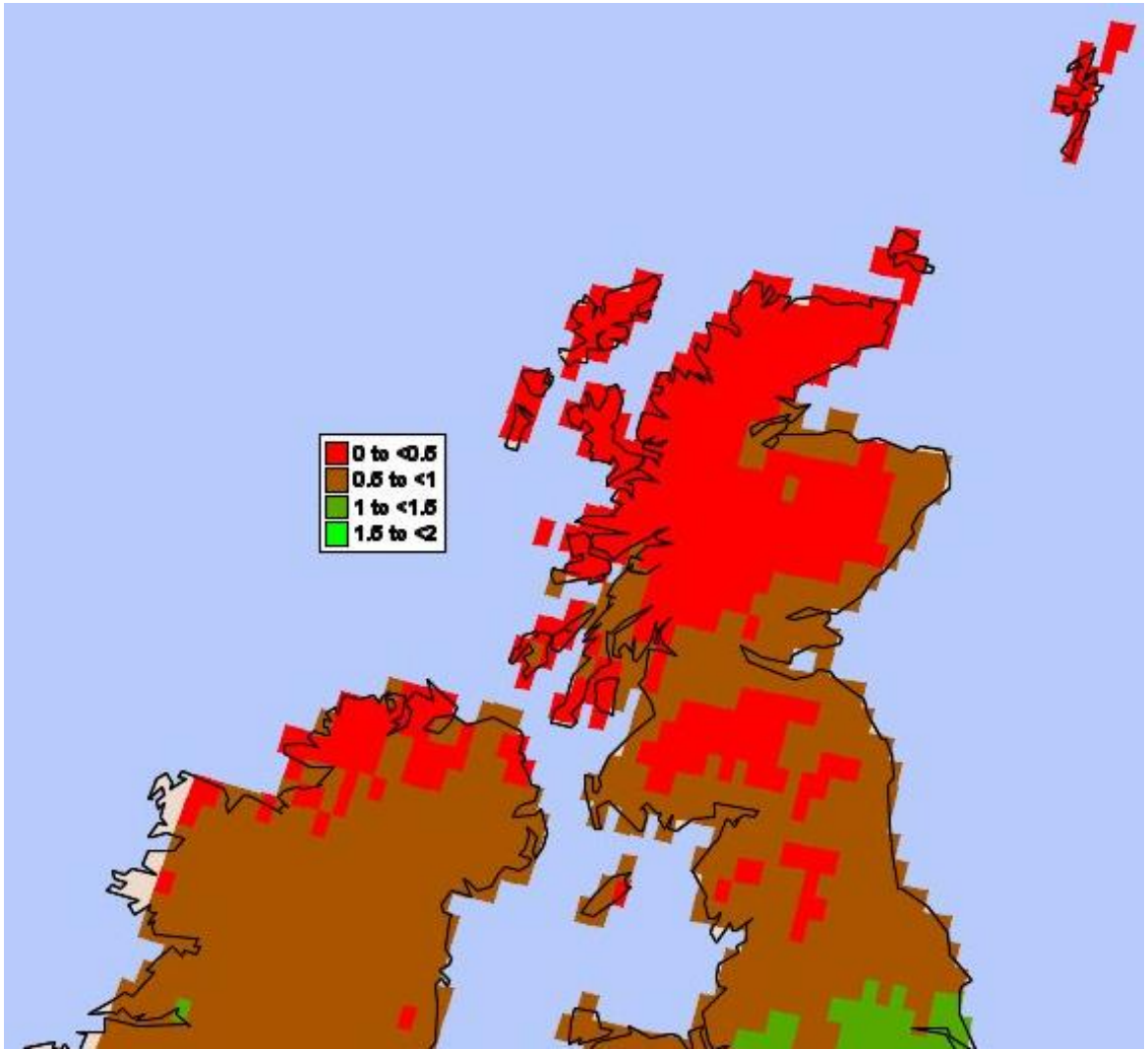
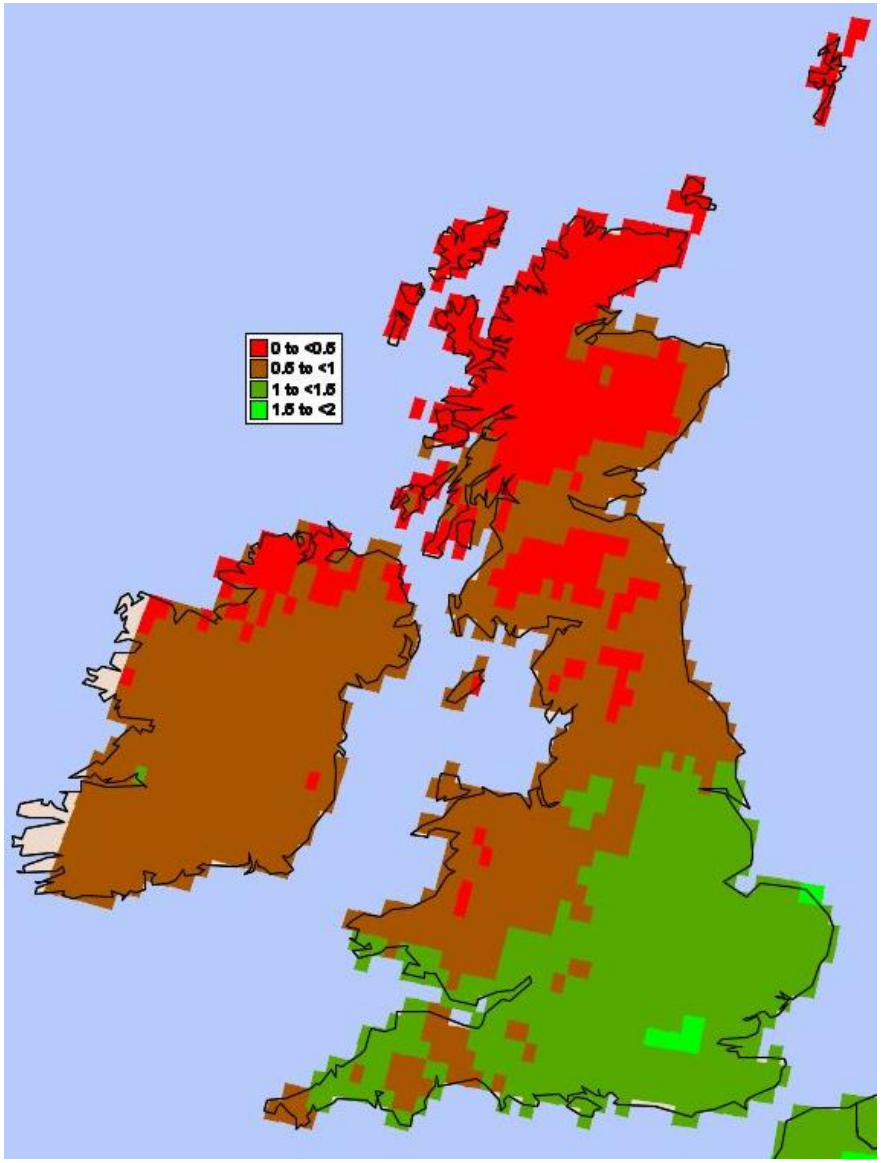
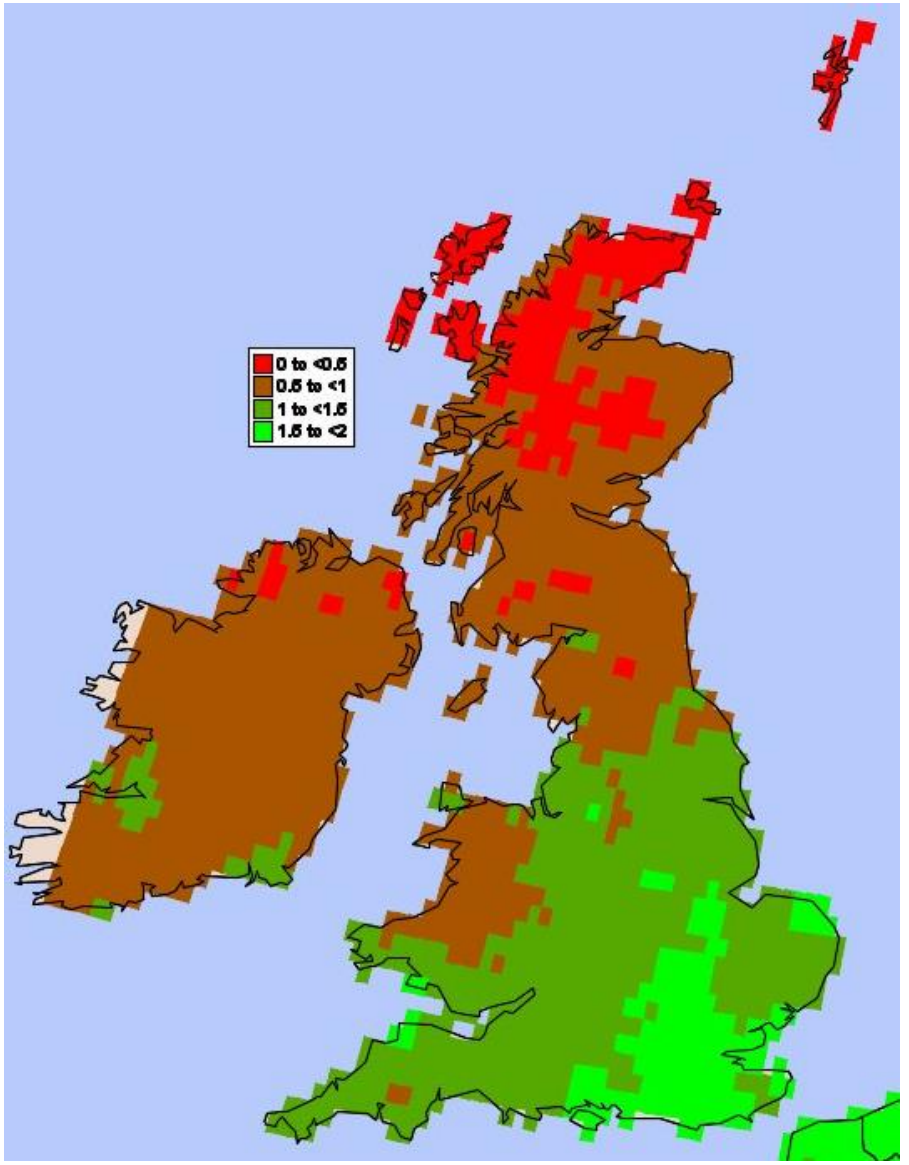


Image: University of Kentucky

Colorado potato beetle current climate: No. of generations a year





Colorado potato beetle current (left) and 2030 climate (right): No. of generations a year

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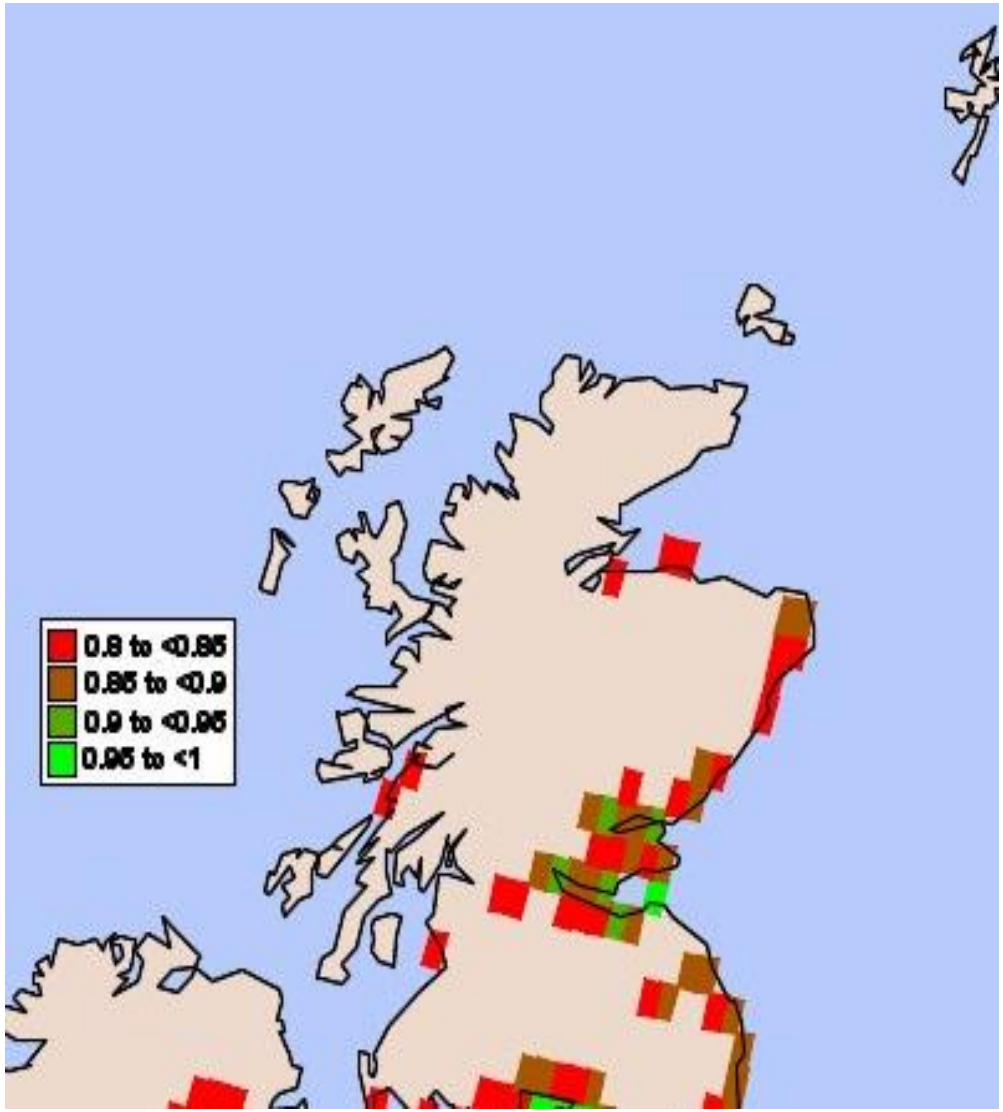

Colorado potato beetle 2030 climate: No. of generations a year (0.8 to 1)

Spotted wing Drosophila

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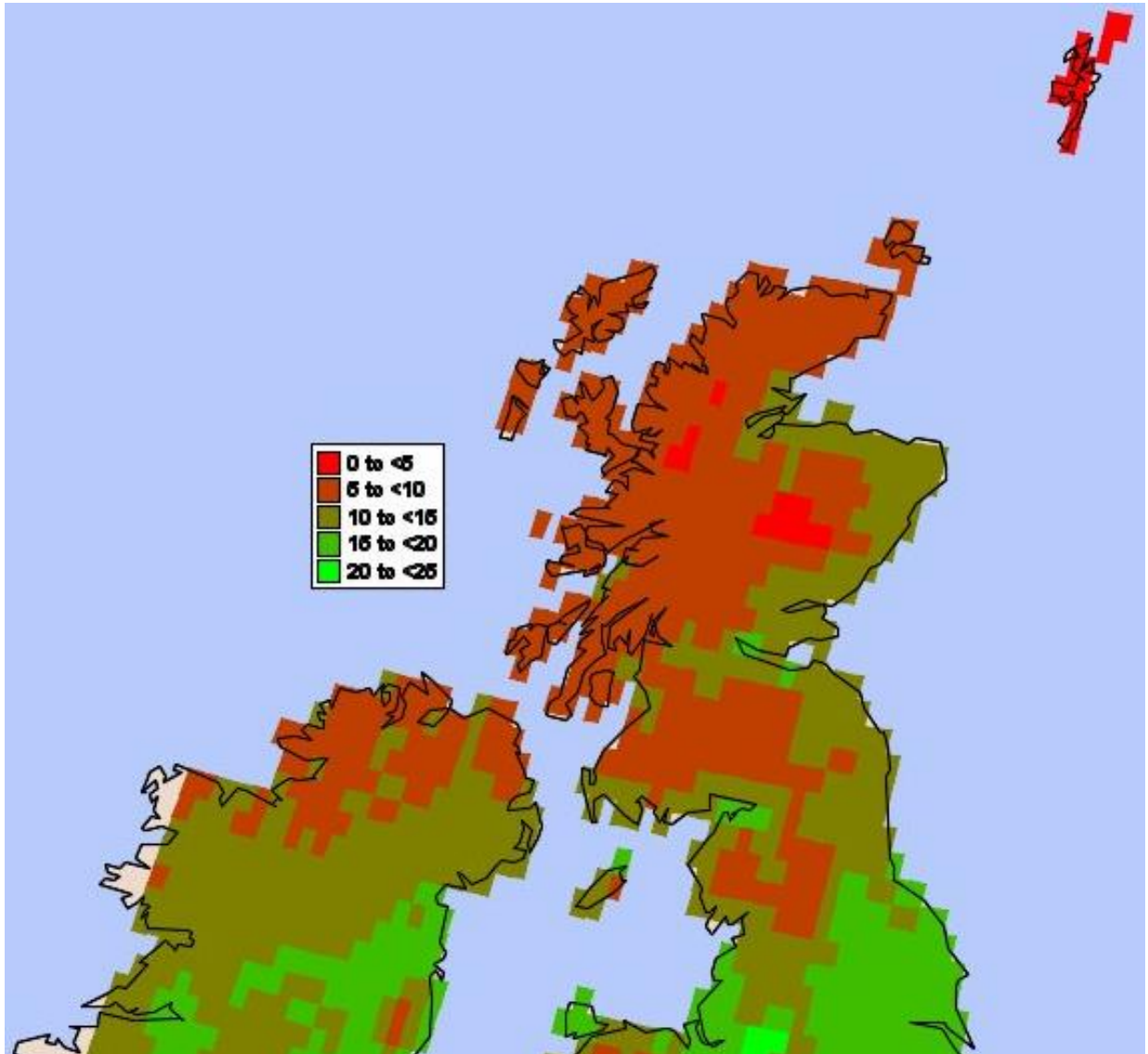
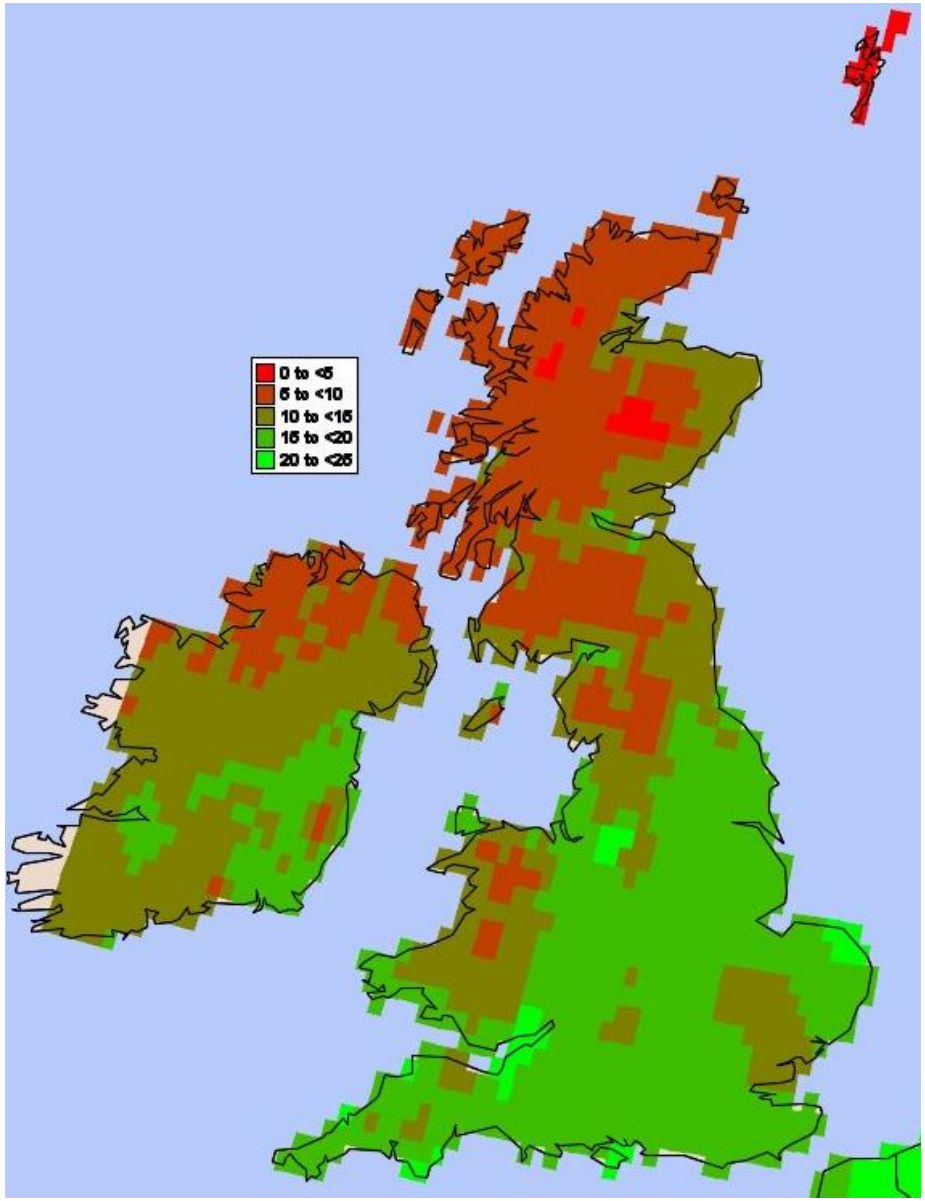
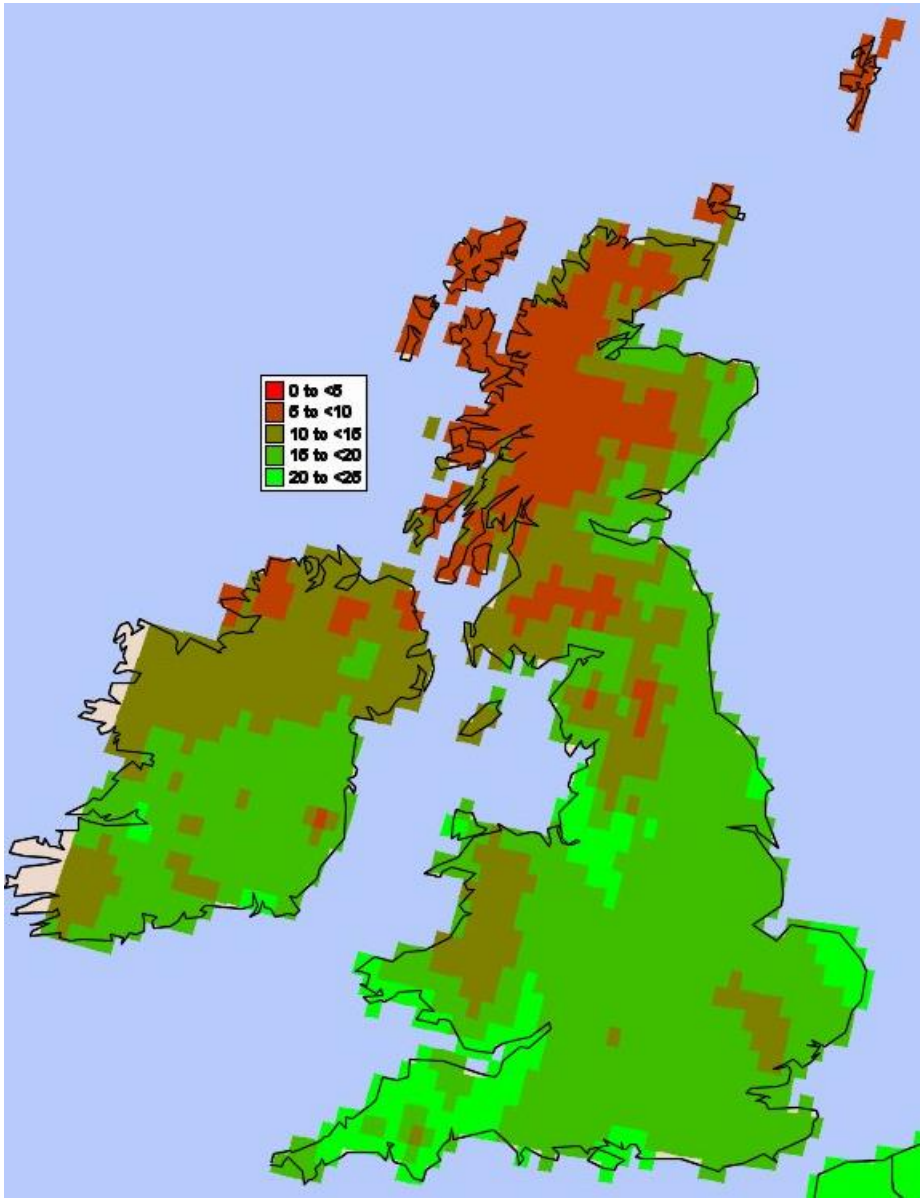


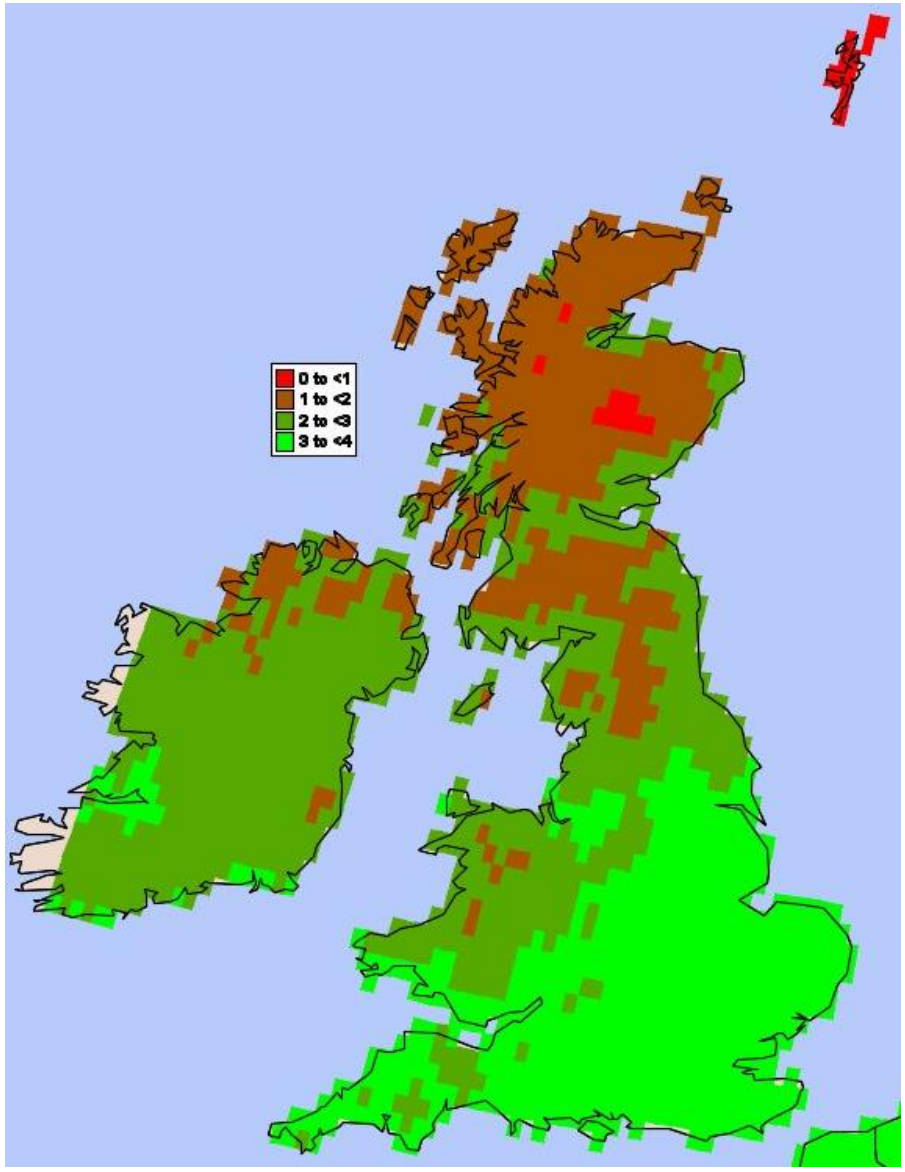
Image: EPPO

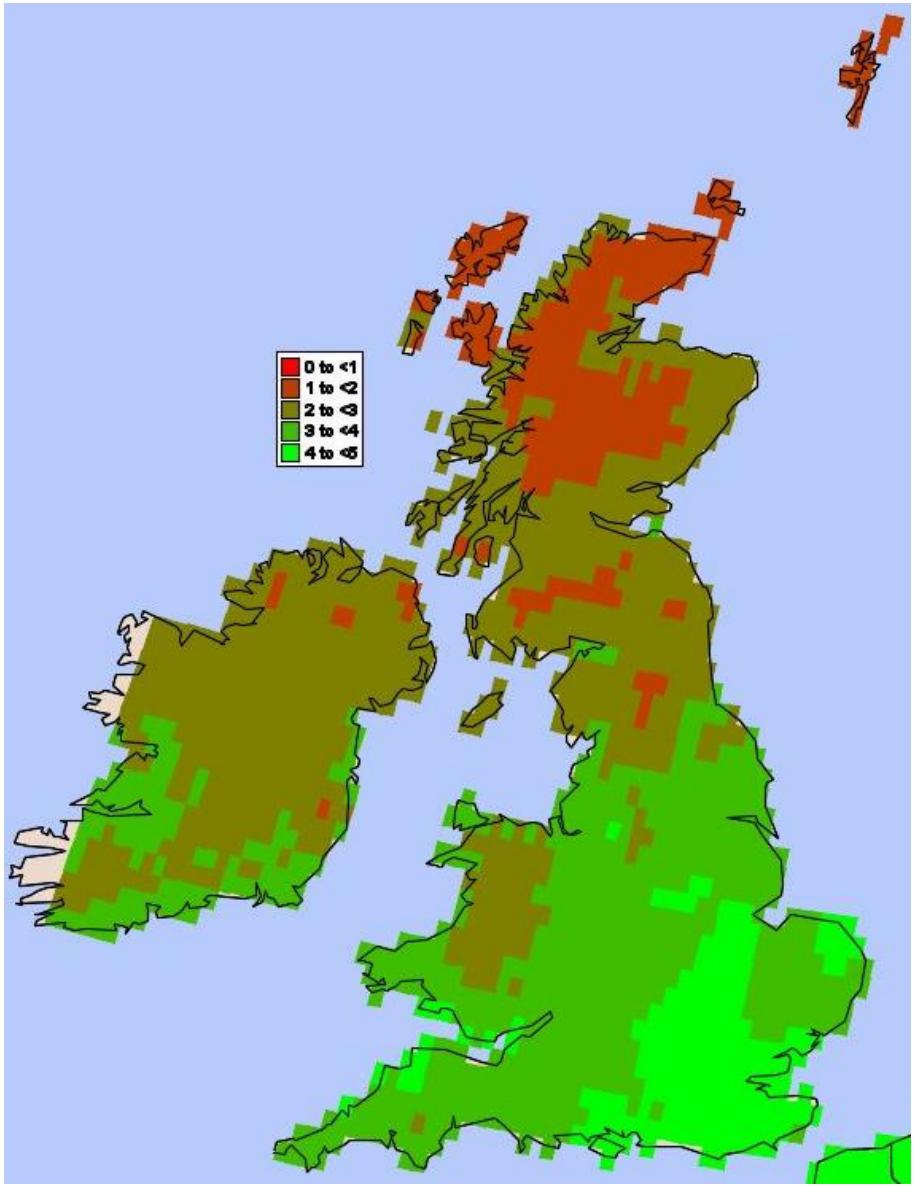
Drosophila suzukii: Ecoclimatic Index current climate





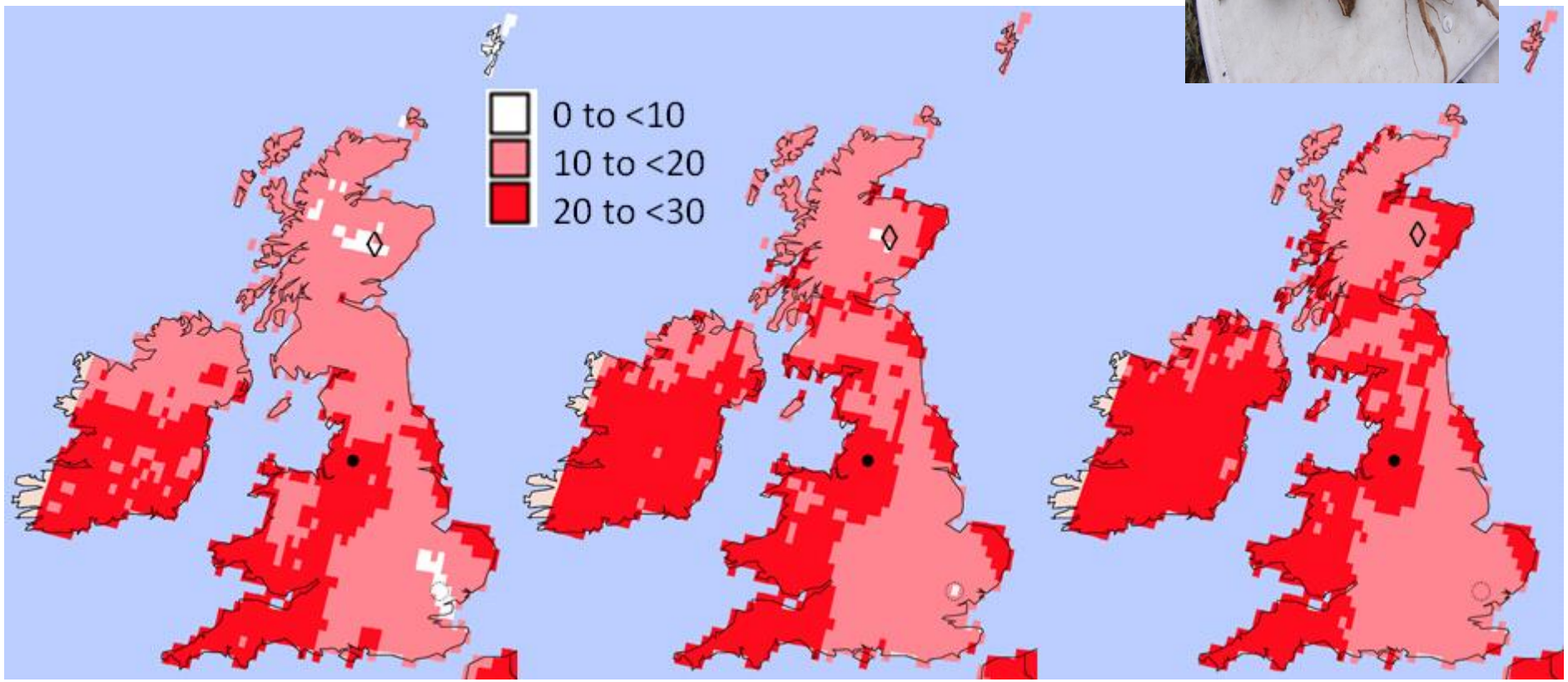
Drosophila suzukii: Ecoclimatic Index current (left) and 2030 climate (right)





Drosophila suzukii: No. of generations current climate (left) and 2030 climate (right)

Clubroot



Ecoclimatic Index (EI) for clubroot: current climate (left), 2030 climate (middle) and 2050 climate (right).

Clubroot

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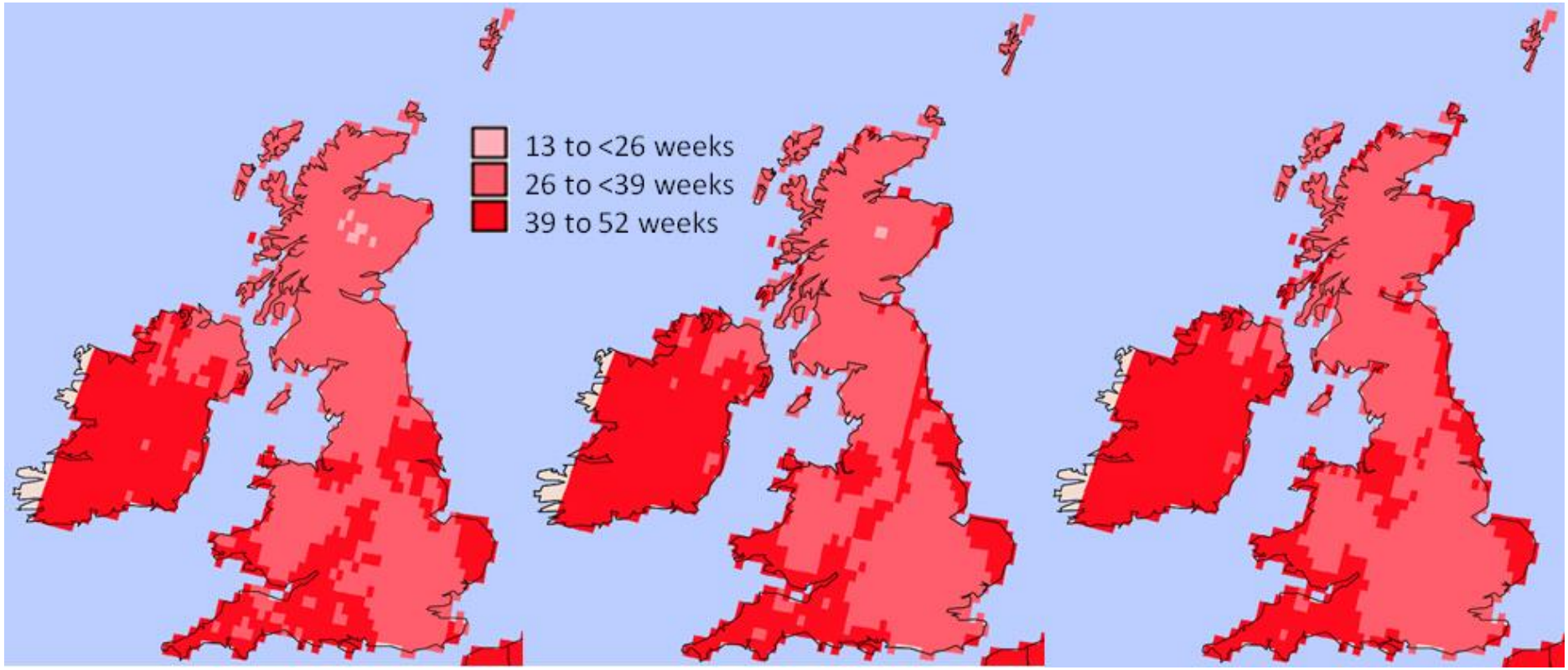
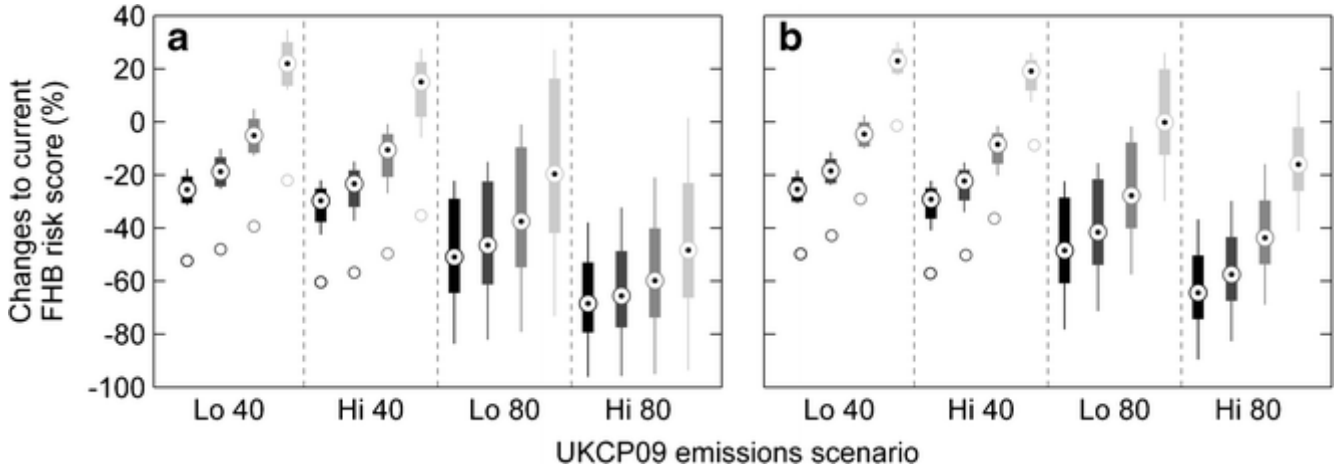


Weeks of positive growth per annum for clubroot under the current climate (left), 2030 climate (middle) and 2050 climate (right)

Fusarium spp

Dates of wheat anthesis and ripening will occur earlier in Scotland. This means that the critical time periods when rainfall favours FHB infection and growth will be earlier in the year, when weather is projected to be drier than the baseline climatology.



Projected change in the risk of contamination of wheat by *Fusarium* head blight in Scotland resulting from **a** increased wheat production, and **b** introduction of maize into crop rotations. The climate change scenarios are low CO_2 (lo) and high CO_2 (hi) for the 2040s and 2080s and projected changes are expressed relative to the 1961–1991 baseline climatology to show the proportional response. Within each climate change scenario, individual boxplots show uncertainty due to internal climate variation for risk scores averaged over all wheat locations and crop distributions for a 10, 20, 40, and 80 % increase in the amount of wheat or maize, respectively

Skelsey, P. & Newton, A.C. Eur J Plant Pathol (2015) 142: 133. https://doi.org/10.1007/s10658-015-0598-7

Interactions with host plant defences:

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- Salicylic acid when faced with pathogens that feed on living tissue
- Jasmonic acid when defending against pathogens that kill first and then feed
- High CO_2 levels increase jasmonic acid levels so defence against fungal pathogens enhanced
- Salicylic acid reduced so defence against bacterial pathogens reduced

Botrytis grey mould

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Summary

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- Predictions highly specific to climate envelopes of pests and pathogens
- Pest and pathogens highly adaptive
- Existing tools can highlight main messages
- Interactions with hosts and with agronomic practices may override climate effects
- More sophisticated models aid preparedness

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Q & A Session

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