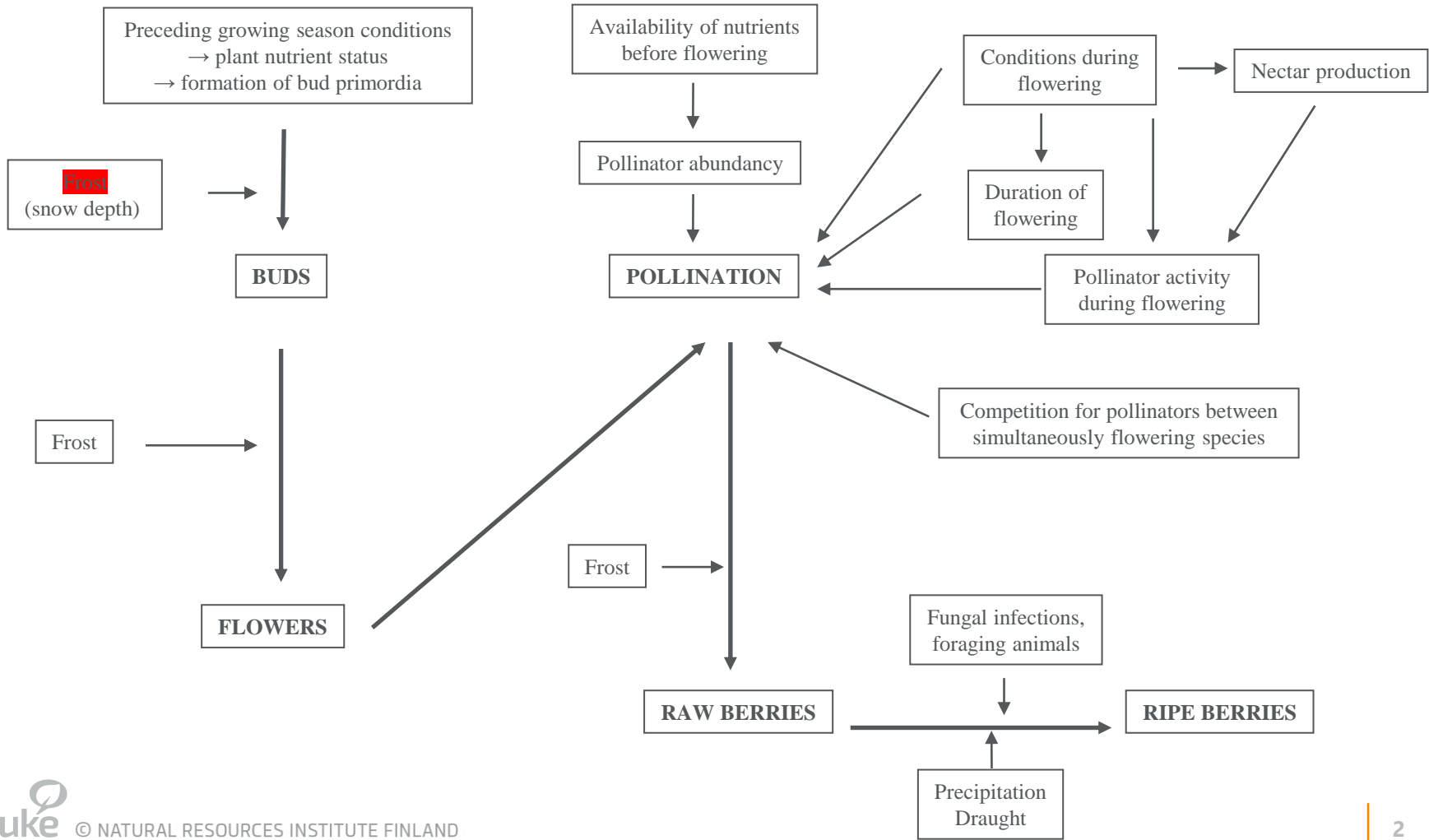


*Effects of climate change on non-timber forest products, case bilberry (*Vaccinium myrtillus*)*

Rainer Peltola, Senior scientist



Snow cover and climate change

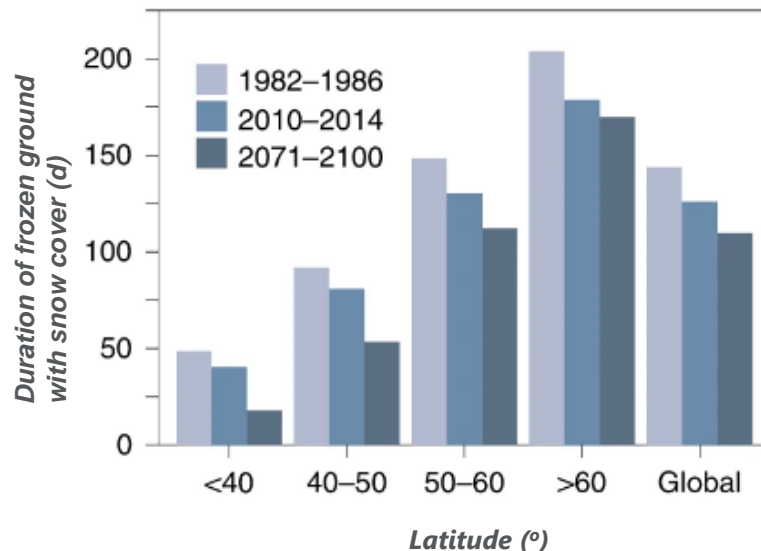
Snow cover extent and duration has decreased in the Northern Hemisphere (remote sensing)



Increased probability of repeated frost damages during overwintering



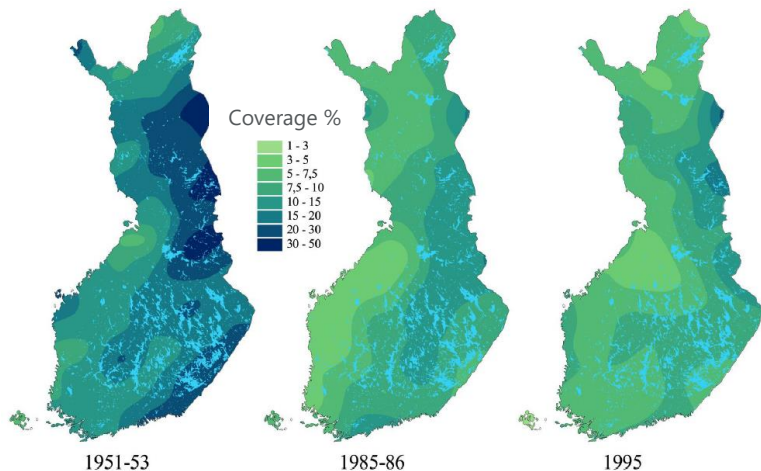
Competitive advantage for graminoides



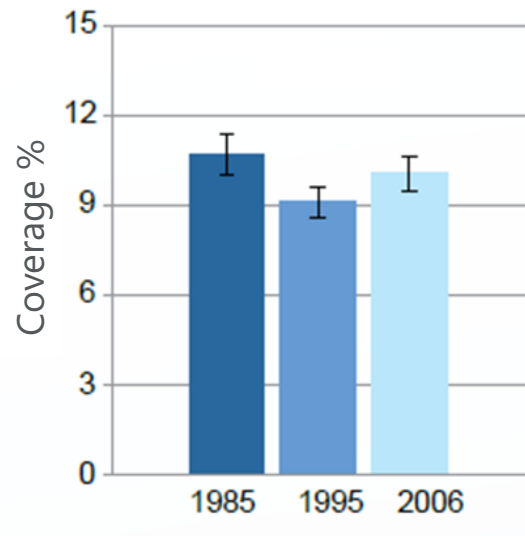
Zhu, L., Ives, A.R., Zhang, C. et al. Climate change causes functionally colder winters for snow cover-dependent organisms. *Nat. Clim. Chang.* 9, 886-893 (2019)

Bilberry coverage

- 1950 -1985

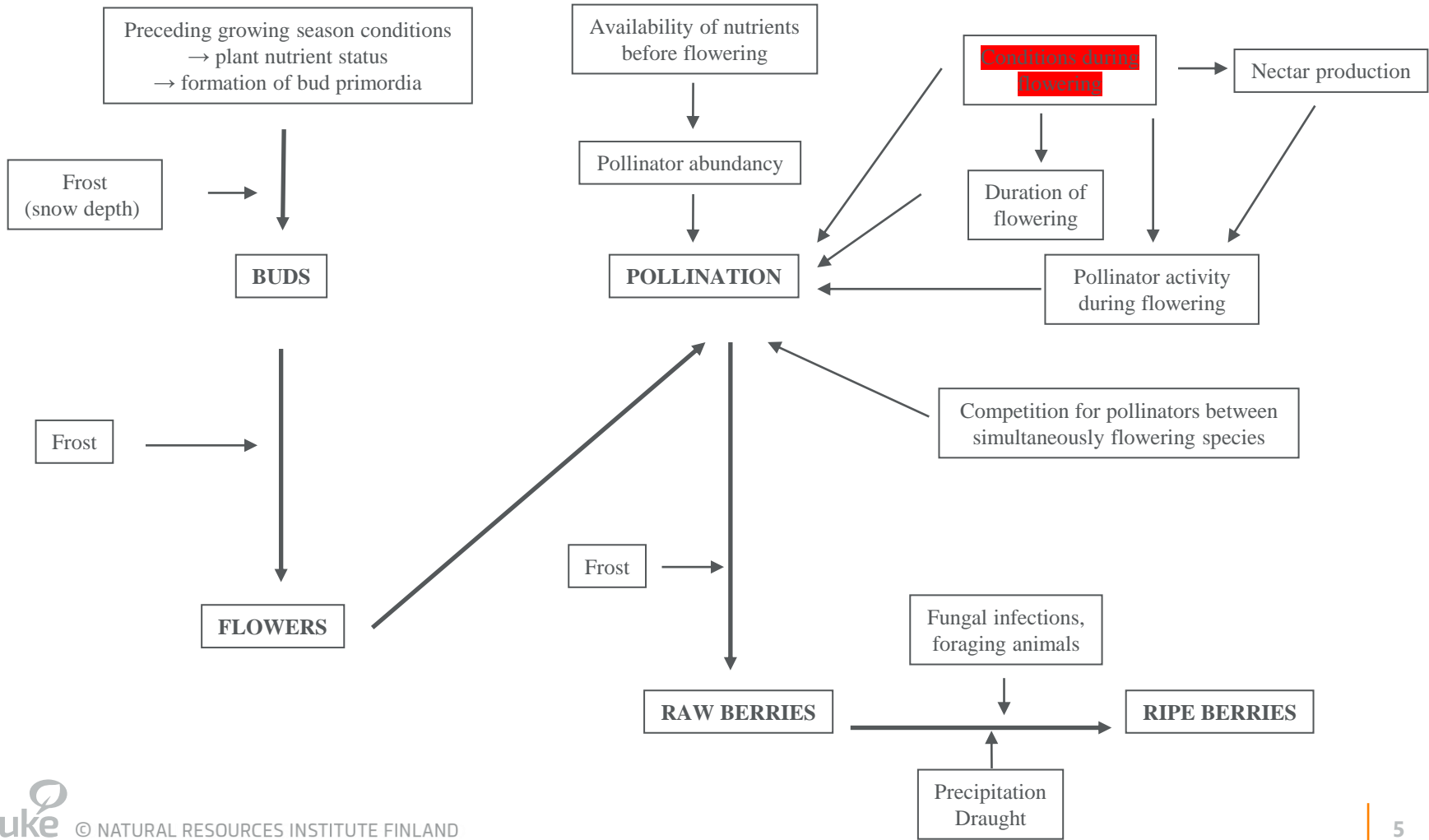


- 1985-2006

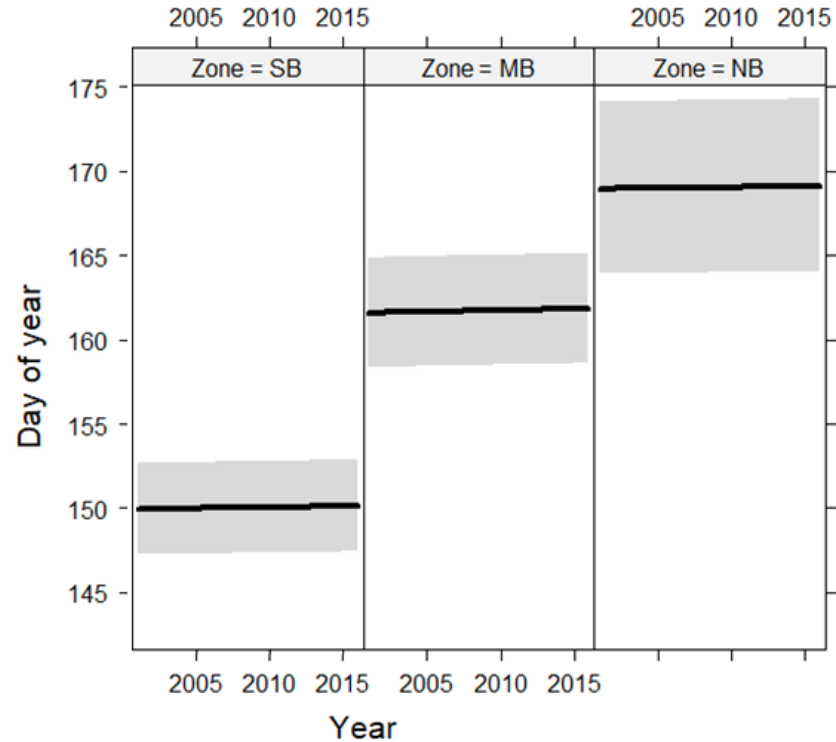
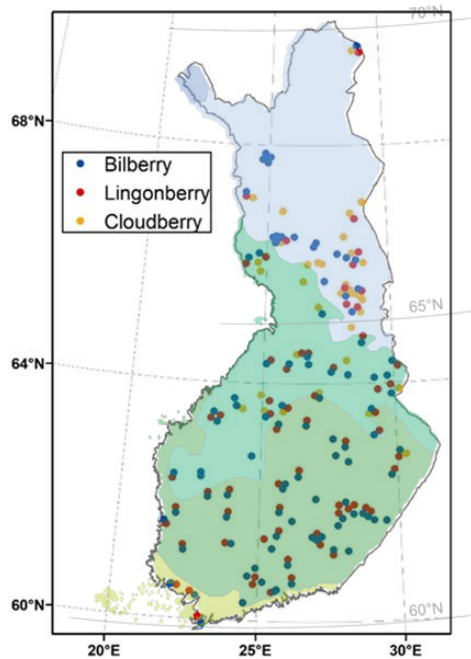


Reinikainen, A., Mäkipää, R., Vanha-Majamaa, I., & Hotanen, J-P. (Eds.). 2000. Kasvit muuttuvassa metsäluonnossa.

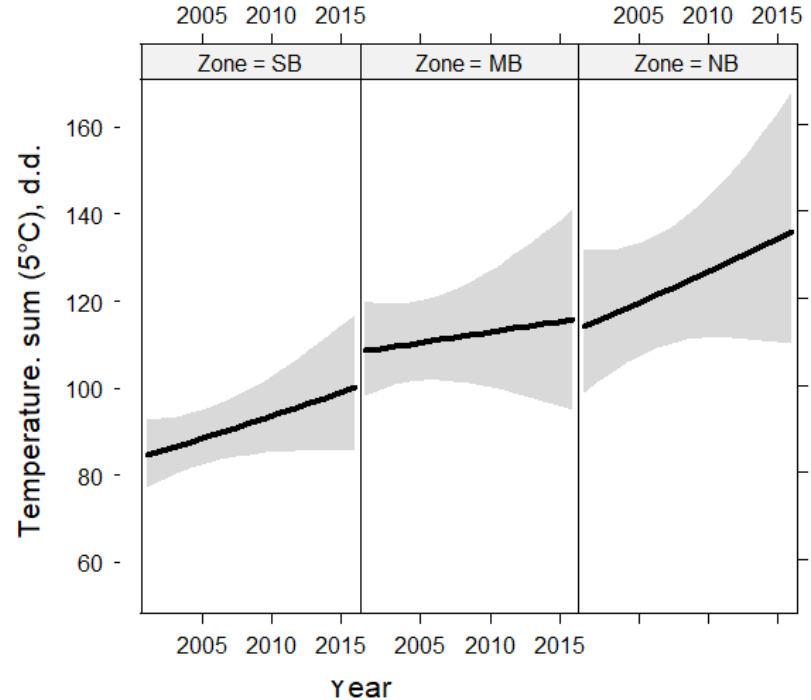
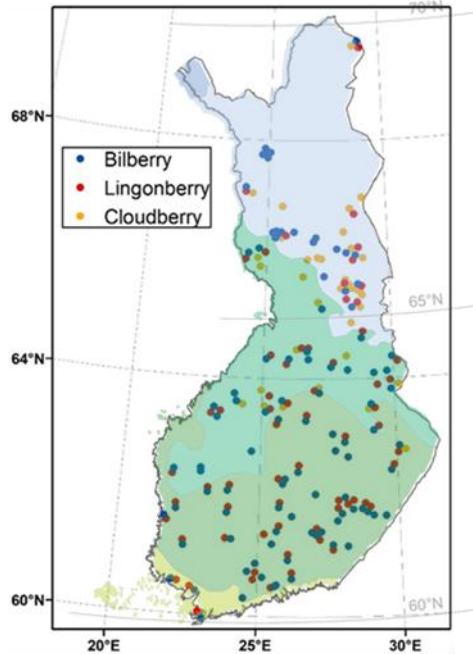
Salemaa ym. 2011. "Mitä olisi metsä ilman mustikkaa", in "Metsät muuttuvat" http://www.metla.fi/julkaisut/seuranta/metsat_muuttuvat.pdf



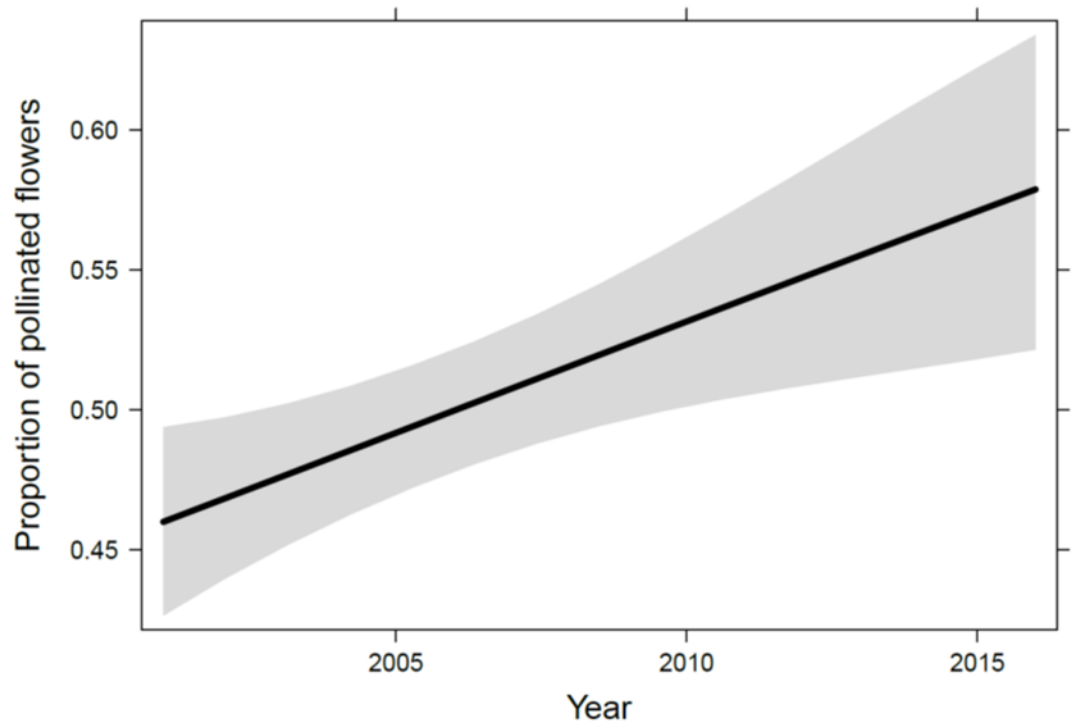
Onset of bilberry flowering in Finland 2001 - 2016

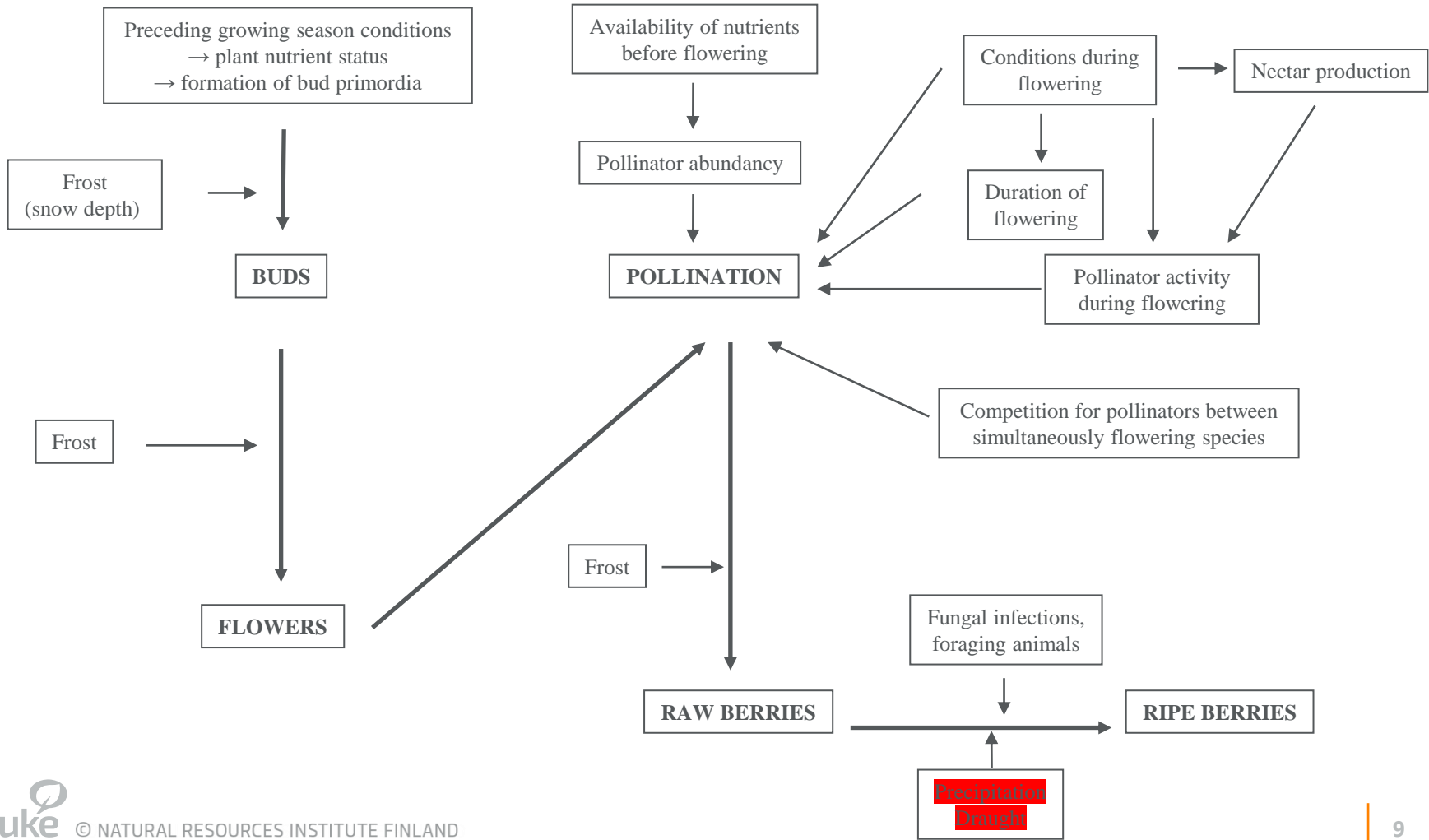


Temperature conditions during bilberry flowering in Finland 2001 - 2016

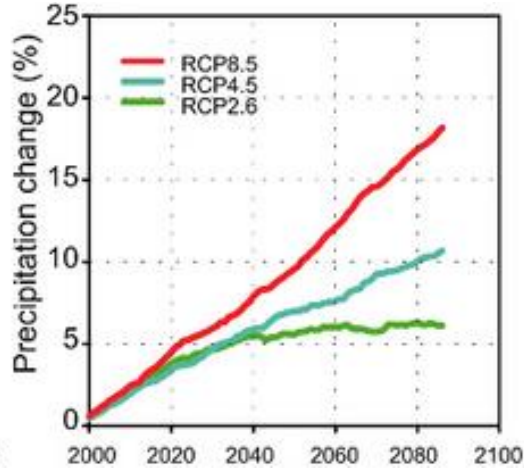


Pollination success of bilberry in Finland during 2001 - 2016





Climate change and precipitation



During April–September, the mean precipitation is expected to rise by 5%–11%

In November 2007, *Phytophthora kernoviae* mold was reported causing a significant threat to *V. myrtillus*

Direct rainfall, heavy humidity → favourable conditions for *Phytophthora*

RCP 2.6 – global rise 1°C by 2100

RCP 4.5 - global rise 2°C by 2100

RCP 8.5 - global rise 4°C by 2100

Venäläinen, A, Lehtonen, I, Laapas, M, et al. Climate change induces multiple risks to boreal forests and forestry in Finland: A literature review. *Glob Change Biol.* 2020; 26: 4178– 4196.

Some conclusions

- Changes in snow depth → changes in bilberry coverage
- Changes in springtime/early summer temperature conditions → changes in pollination success
 - So far positive changes
 - Future - will the onset of flowering become earlier? Will there be enough pollinators for berry plants flowering earlier?
- Increased precipitation
 - Pathogens, especially fungi (*Phytophthora?*)

Thank you!