


## SnoEco: High Arctic ecosystem responses to changes in snow cover


-a study at the plot and landscape scale

Elisabeth J. Cooper

UiT- The Arctic University of Norway  
Tromsø, Norway



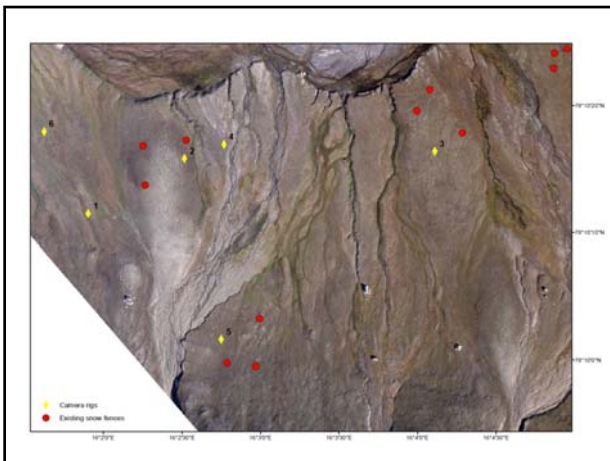
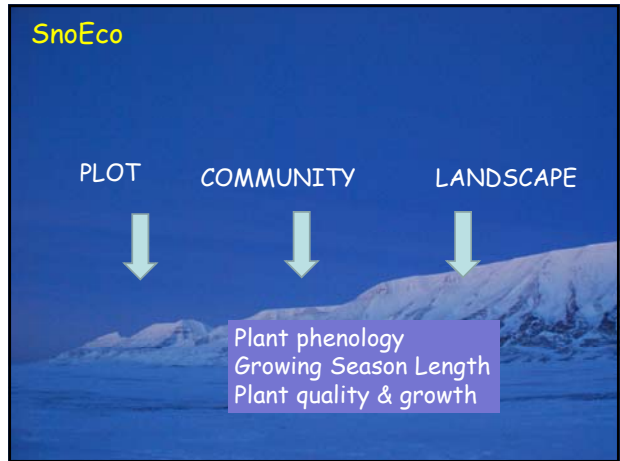
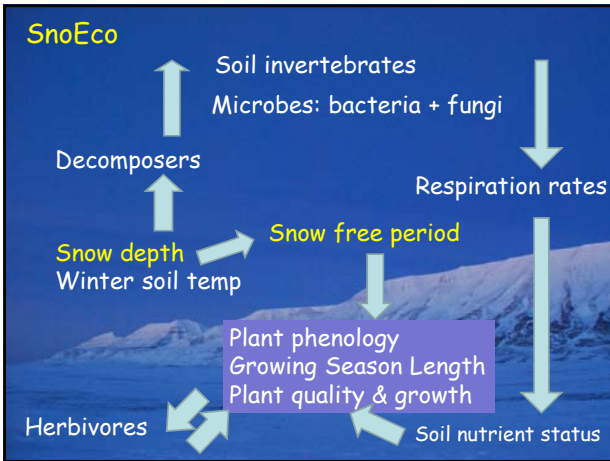
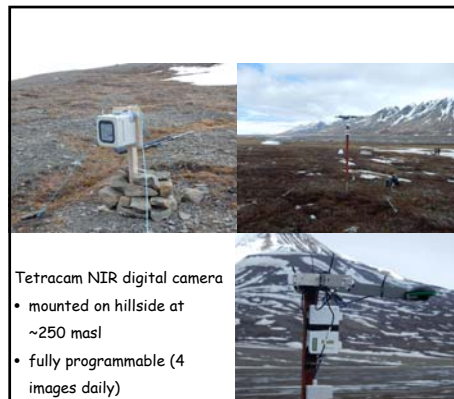
## Timing of snowmelt



..is a very important determinant of start of growing season.

=> How does winter snow depth, timing of snow melt, winter/summer temperature and moisture affect plant growth and ecosystem processes ?

=> By manipulating snow cover and observing on the landscape scale, we can start to investigate these relationships.

Decagon NDVI sensors

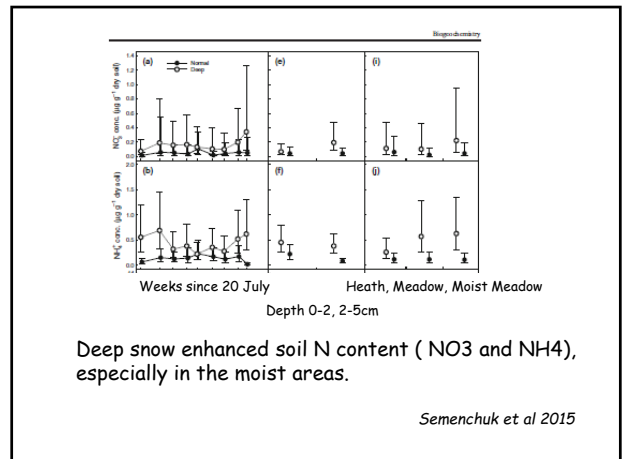
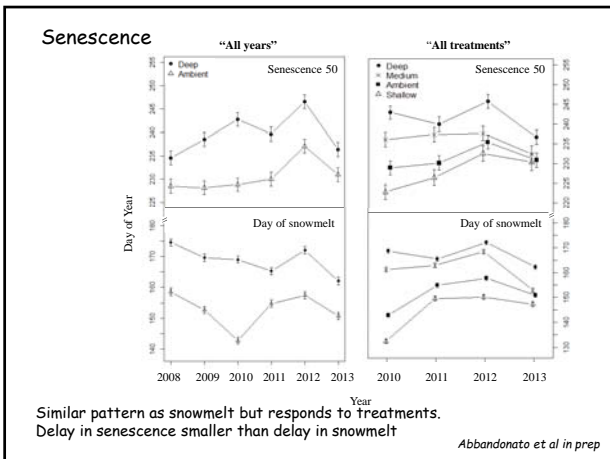
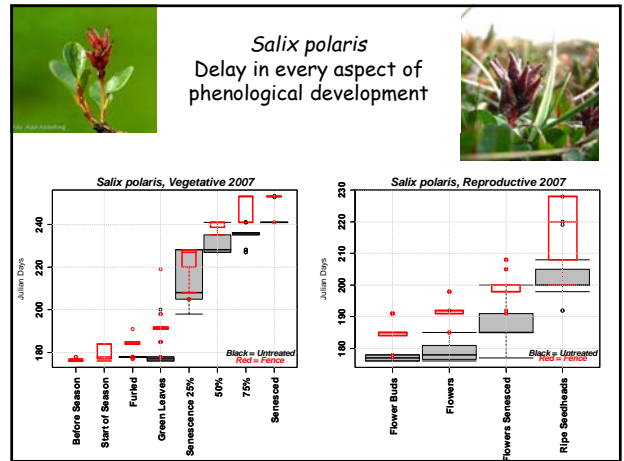
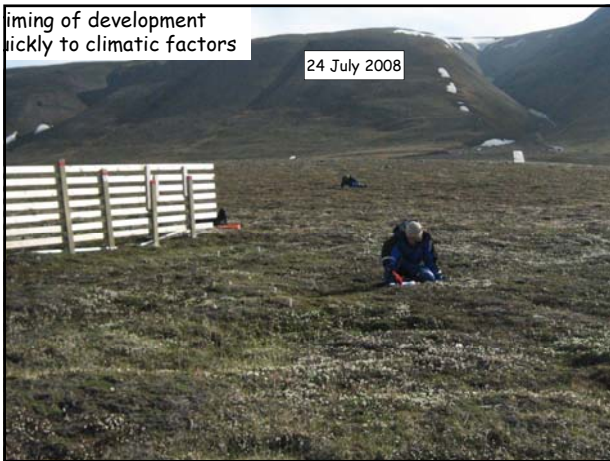
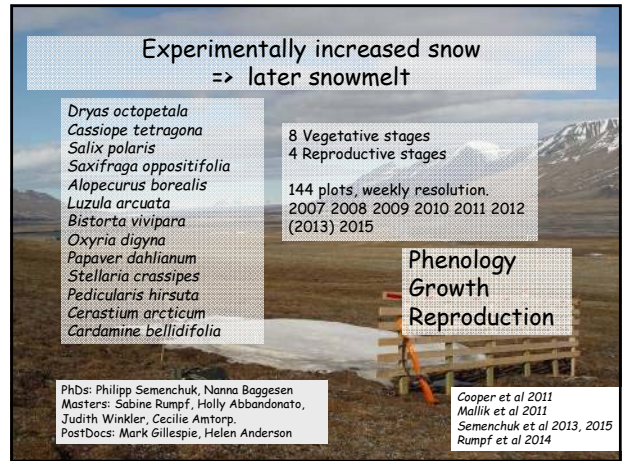
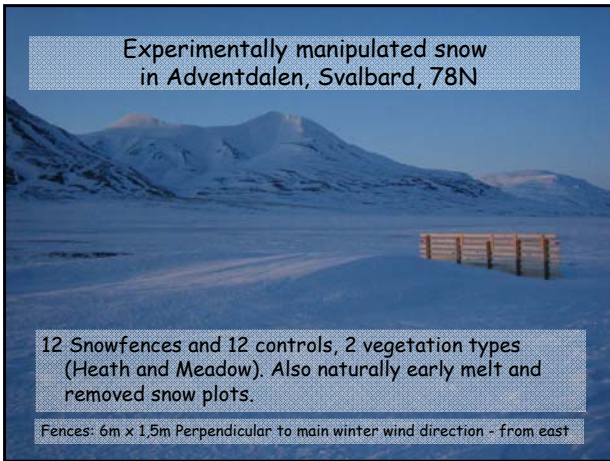
- mounted at 2 m height
- programmable (every 4hrs)
- wavelengths 650 nm and 810 nm

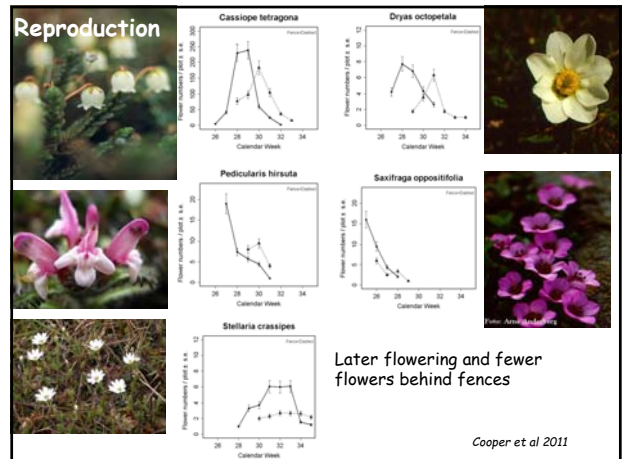
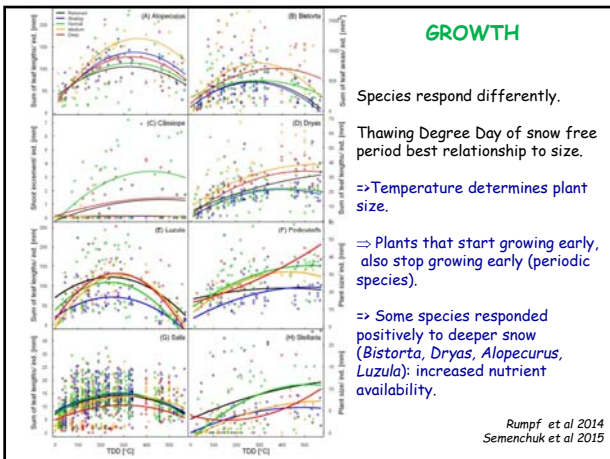
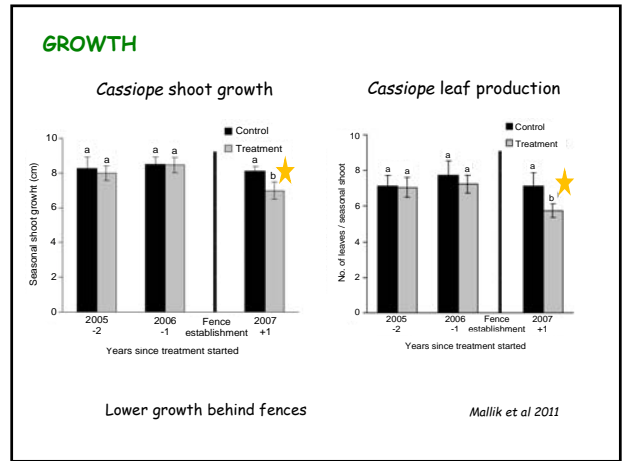
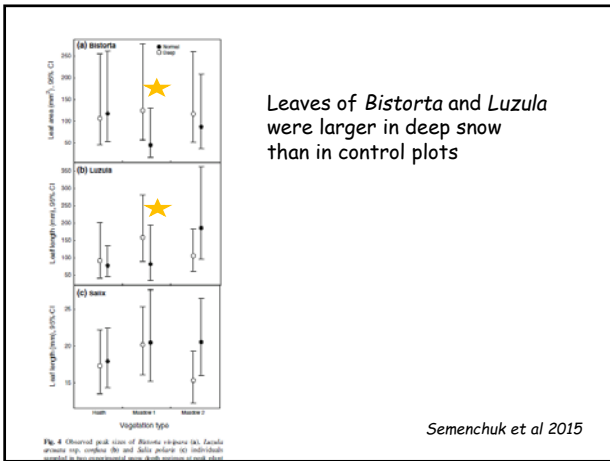
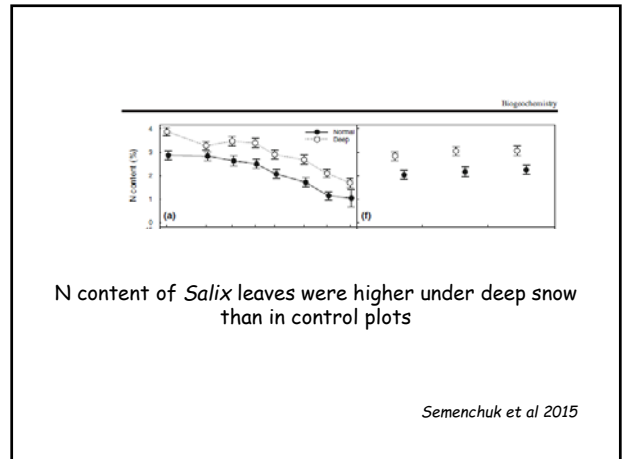
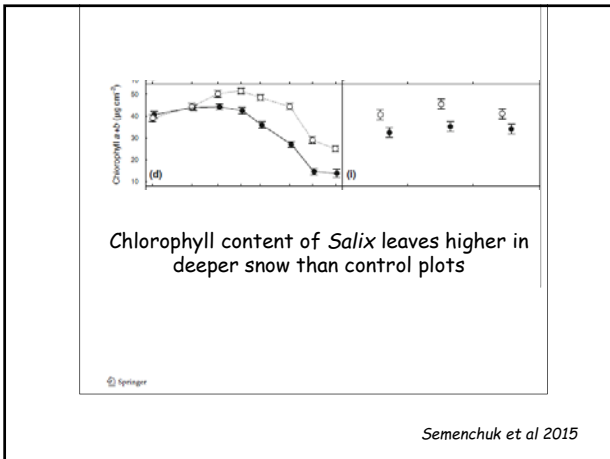
Tetracam NIR digital camera

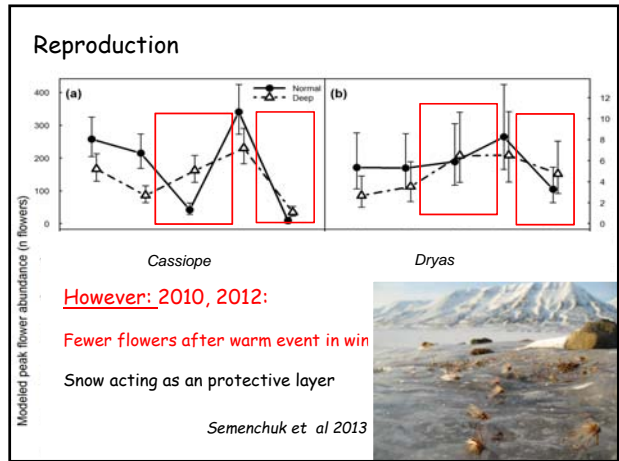
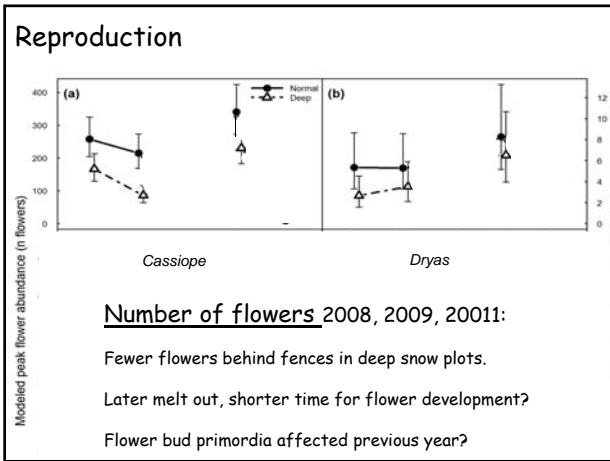
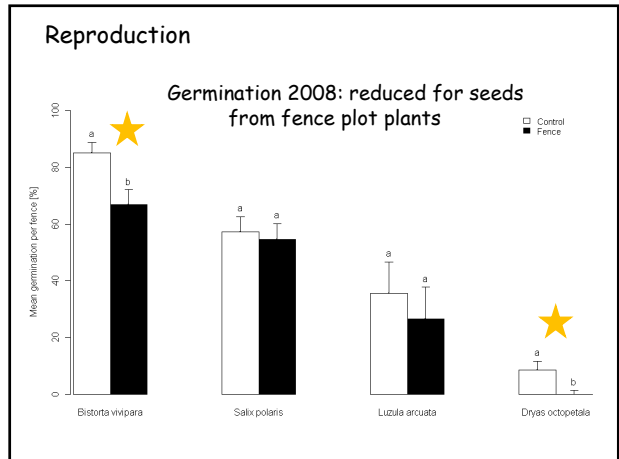
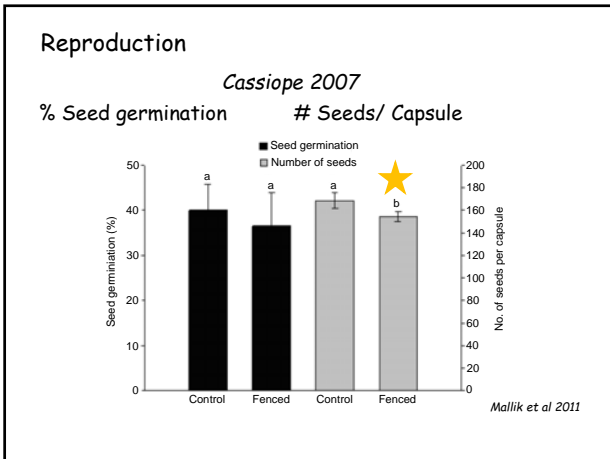
- mounted on hillside at ~250 masl
- fully programmable (4 images daily)
- wavelengths approx. equal to TM bands 2, 3, 4

GardenWatch camera

- mounted at 2 m height
- programmable (every 4hrs)
- RGB wavelengths







**Experimentally manipulated snowdepth and melt**

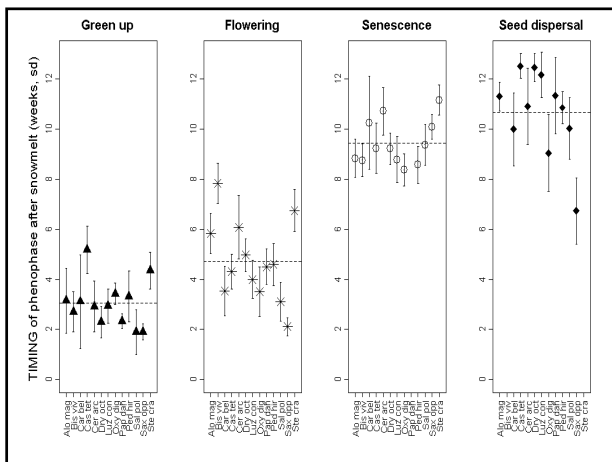
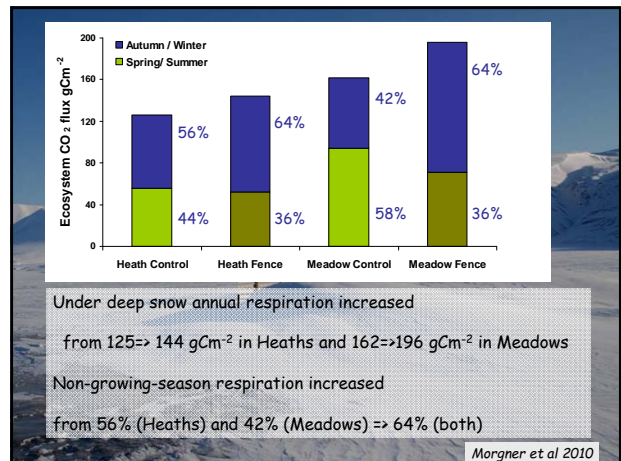
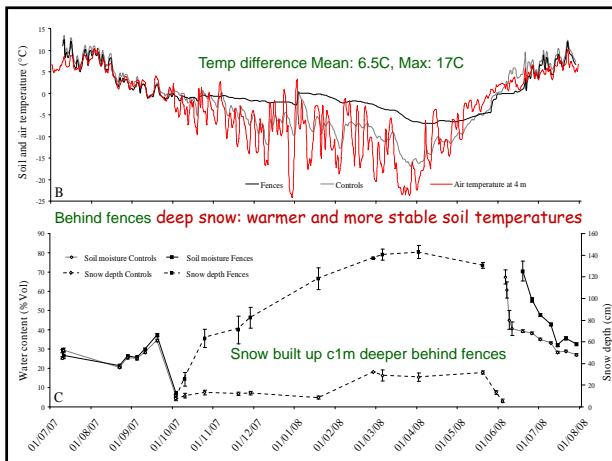
**Phenology:** earlier green up with early melt if subsequent warmer temps, late melt delayed early season phenology.

**Senescence:** some response to snow melt, partly light controlled.

**GSL:** species specific: some are periodic species, others just kept growing..

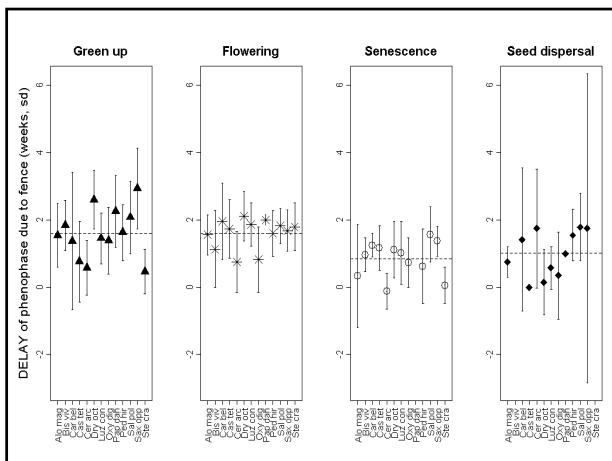
**Growth:** related to Thawing Degree Days: generally reduced growth and higher % BG with later snow melt- BUT deeper snow => higher nutrients, some species benefitted (eg *Bistorta*).

**Reproductive success:** generally related to GSL => reduced flowering and viable seeds with later melt- BUT deep snow protected flower buds in mild periods with snow melt mid-winter.



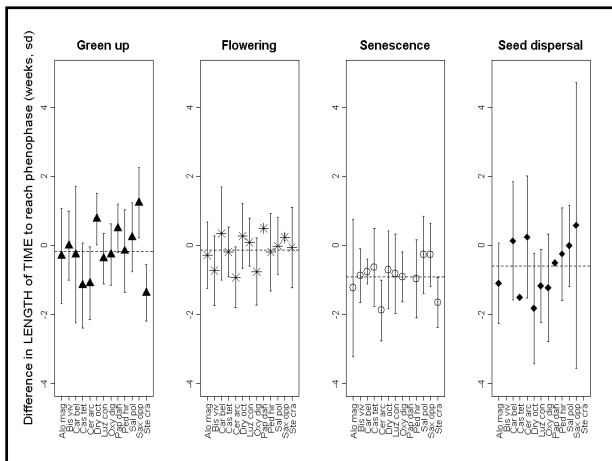
Delay of phenophase due to fence  
(# weeks later than control)

- Green-up
- Flowering
- Senescence
- Seed dispersal



Length of time needed from snowmelt to reach phenophase.  
Difference (in weeks) due to fence

- Green-up
- Flowering
- Senescence
- Seed dispersal



### Change in duration due to fence

- Length of growing season  
(date of senescence-green-up)
- Length of reproductive period  
(date of seed dispersal- date of flowering)

