# Traitors:
## Background and hypotheses

5 March 2021

## 1 Traits and their importance as a functional trait

Following the PCA, we are focusing on the following traits: height, specific leaf area, leaf nitrogen content, seed mass.

- Height: related to species position in the canopy and competition for light, tall trees require greater structural strength and have denser wood
- Specific leaf area: the area of a leaf over the dry mass, positively correlates with relative growth rate, LNC, and photosynthetic rate; negatively correlated with leaf lifespan. Leaves with smaller SLA should be more frost tolerant, with relatively smaller leaf areas.
- Leaf nitrogen content per mass: positively correlated with photosynthesis and SLA; leaves with high LNC are more nutritious
- Seed mass: relates to seedling survival, especially in the understory, smaller seeds tend to have longer seed banks

Plants with fast growth are predicted to how high values of SLA, higher nutrient content, and maybe smaller seeds (exact citation needed). These tradeoffs reflect physiological requirements, and nutrient requirements for photosynthesis and respiration.

## 2 Working hypotheses

These hypotheses were developed by the traitors group prior to the start of 2021, with more recent updates to be discussed.

1. Chilling
    - Species with high chilling requirements will have traits associated with greater protection from harsh conditions and higher competitive abilities, but requiring longer periods to accumulate chilling and days to budburst.
    - SLA should positively correlate with increasing chill requirements, leaves with large SLA are less frost tolerant
    - Height should positively correlate since there will be more competition for light
    - Seed mass may negatively correlate as later species have less time for seed development
2. Forcing
    - Species with low forcing requirements will express traits related to frost tolerance and high productivity through faster resource acquisition.

- Leaves should have smaller SLA; smaller, thicker leaves are more frost tolerant
- Heights can be smaller as there is less competition for light prior to canopy closure
- Seed mass may greater as there is more time for seed development
- LNC will be greater and is a proxy for photosynthetic rates

3. Photoperiod

    - Species with high photoperiod requirements will budburst later and should have traits associated with greater competitive abilities.
    - SLA should positively correlate with increasing photoperiod requirements
    - Height should positively correlate since there will be more competition for light
    - LNC will be lower in later budbursting species