Phd-project: Vitality of Heather (*Calluna vulgaris*) in dry heathlands along gradients of climate, structure and diversity in the North German Lowlands

**Rethinking relations between**

heather plant age, growth stages and vitality

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Heather life cycle

Timespan of whole life cycle and longevity of plants in growth stages?

Life cycle concept basing on Watt 1955 & others, picture: Gimingham (1975/1987), modified
**Sampling**

19 study areas
352 plots (25m²)

1724 heather plants
(<= 2 from each growth stage)

1 - 3 cut points / plant
1 - 5 wood samples / cut point

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Cut points individuum age
- Red: Rootstock
- Orange: Stem base

Cut points aboveground age
- Light blue: Aboveground: 20 - 25cm height
- Green: Aboveground: 10 - 15cm height
Conclusions: primary life cycle
Age of plants in growth stages

Primary life cycle (undisturbed) ends after 15 - 20 years

Fast grow-up to mature

Pioneer 1 - 3
Building 2 - 6
Mature 5 - 12
Degeneration 8 - 15 (20)
Regeneration processes

Germination and seedling establishment

Resprouting

Layering
Regeneration ~ age

Regeneration patterns and vitality after intense management

**Primary cycle**
Resprouting capacity from rootstock

**Primary cycle**
Resprouting capacity from stem bases

**Primary cycle**
Layering capacity of downlying stems

**Secondary cycle from resprouting**
Resprouting capacity from stem bases

**Secondary cycle from resprouting**
Layering capacity of downlying stems

**Secondary cycle from layering**
Layering capacity of downlying stems

**Vitality of heather plant**
Primary growth
Secondary growth
Tertiary growth (resprouting)
Tertiary growth (layering)

**Height of resprouted heather plant**
Primary growth (reference)
Secondary growth
Tertiary growth

**Height of heather plant Regenerated from layering**
Primary growth (reference)
Secondary growth
Tertiary growth
Conclusions: Regeneration life cycle
Persistence of plants in growth stages

**Lifespan**

**Primary cycle:**
~ 8 - 15 years

**Regeneration cycle:**
- *resprouting* 9 - 12 years (± x)
- *layering* 5 – 15 years (± x)

„real life span“
19 – 25 years (1R)
20 – 30 years (2R)

No evidence for plants older than 28 years.

No evidence for more than two regeneration cycles.

Building
Layering
2 – 12

Resprouting
1 – 3

Mature
3 – 6

Degeneration
2 – 15
5 – 10

Uncertainty in deriving individual plant age from growth phase
Final conclusions

**Growth phases are a good tool for assessing structural diversity of heathstands.**

But they are **unvalid in prediction of individual plant age.**

**Regeneration capacities are declining with individual age.**

- High vital resprouting only from young plants or young secondary regeneration
- Layering regeneration of older plants provides low regeneration capability
- Regeneration from layering can form stable, but low-vital growth stages
- Possibility for regrowth of Mature plants strongly decreases with regeneration cycle

**successful regeneration on a high-diversity and conservation level needs:**

- 10-15 year intense management cycle and
- germination and establishment of „new“ heather plants and
- favourable abiotic conditions
NATO training area, Bergen, Niedersachsen (Germany)
Habitat type 4030
Dry European heath

Habitat type 2310
Dry Sand heaths with Calluna and Genista