



*Nerine krigei*

# Cultivation of grassland geophytes on soils from different land-uses

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# Importance of geophytes in grasslands

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*Haemanthus montanus*

Grasslands play a key role in water and carbon cycles

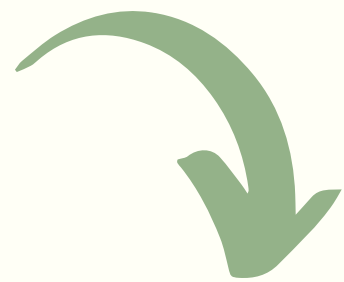
Geophyte underground storage organs (water and carbon)

- Unaffected by fire, frost and grazing
- Thus, cycles more stable in grasslands

# The Problem

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Ploughing



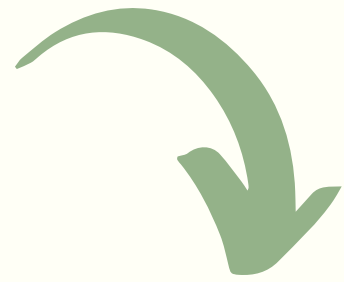
Loss of geophytes



Localised seed dispersal

# The Problem

Ploughing



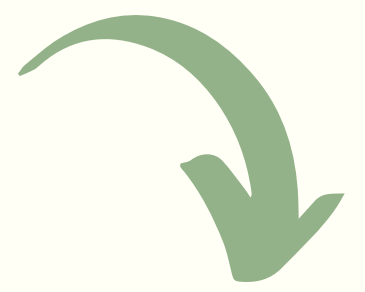
Loss of geophytes



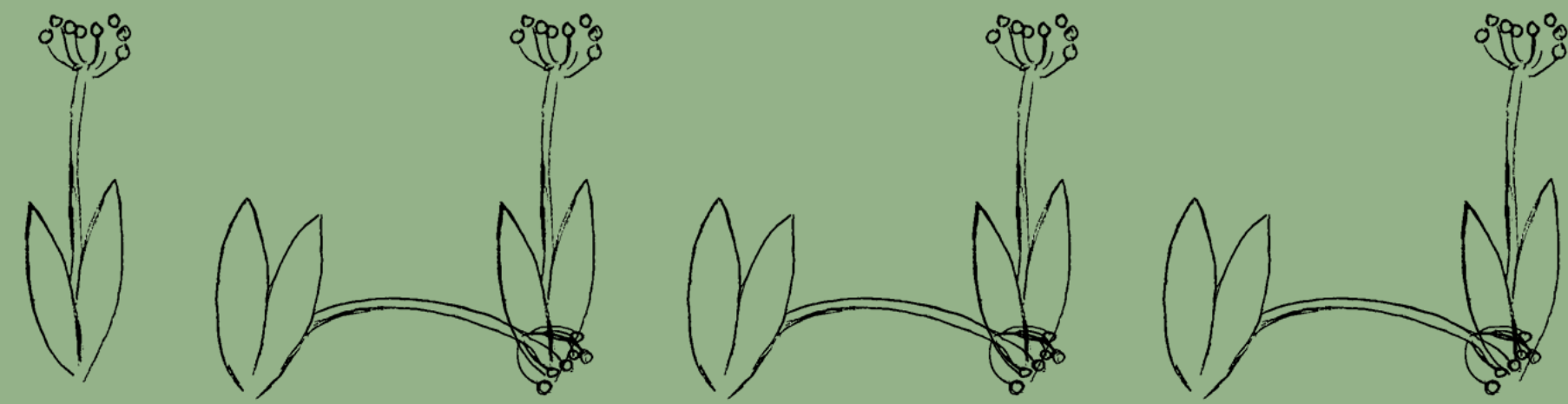
Localised seed dispersal

# The Problem

Ploughing



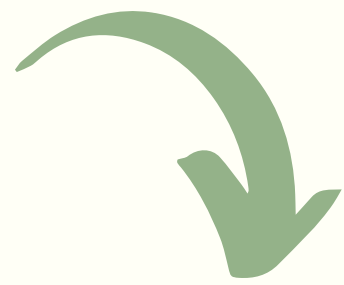
Loss of geophytes



Predation

# The Problem

Ploughing



Loss of geophytes



Hard soil - exposed seeds

Compact soil



# The Problem

Ploughing



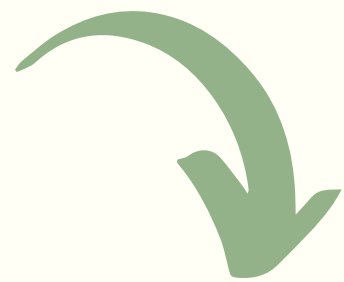
Loss of geophytes



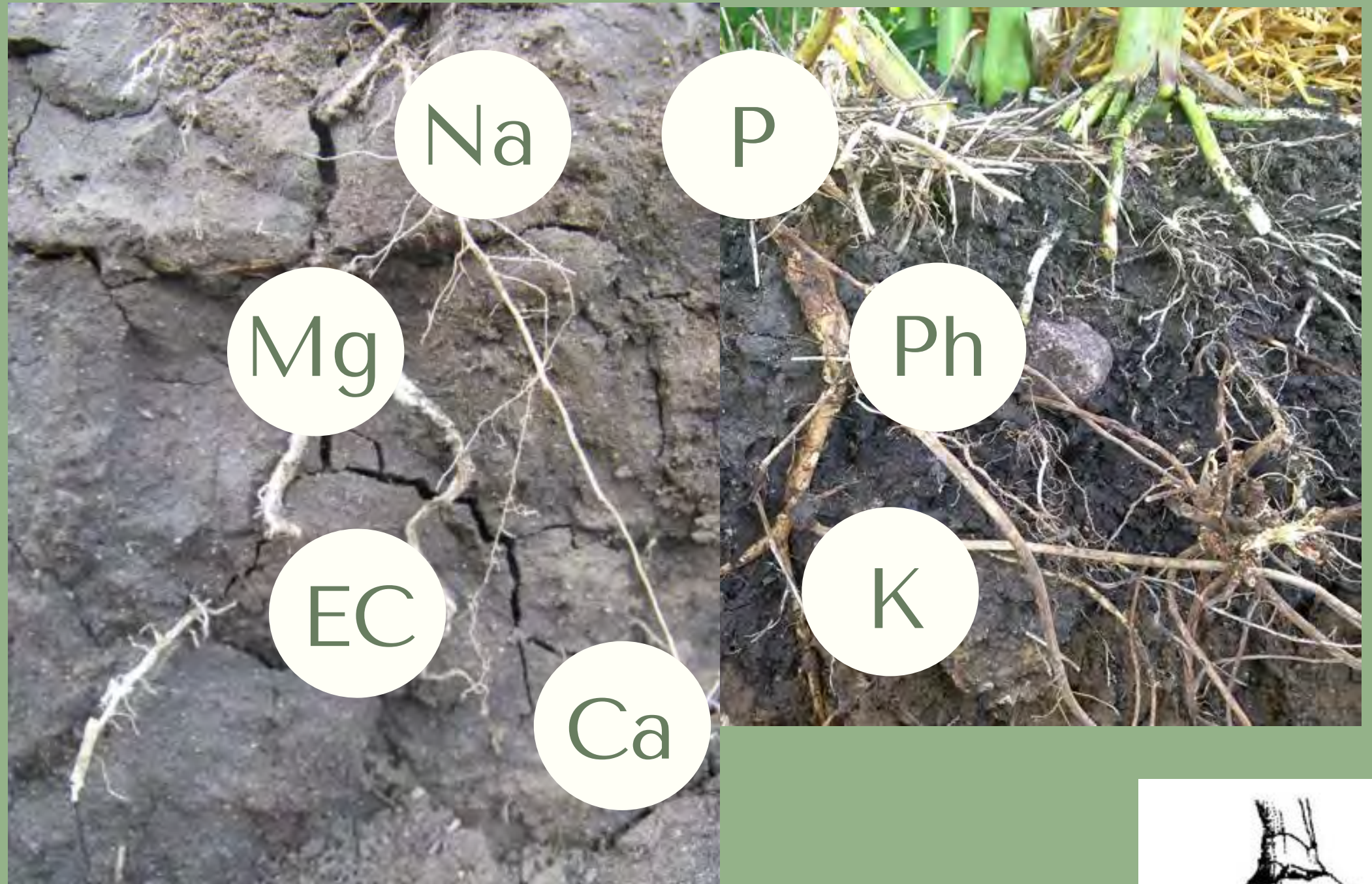
# Altered properties of ploughed soil

## The Problem

Ploughing



Loss of geophytes



Discussed in presentation by Wihan Nel





Possible solution?

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Can these ploughed  
fields be restored with  
geophytes?





A WORK IN  
PROGRESS

Aim: Test whether  
active restoration  
is possible  
through cultivation  
of geophytes

# Study site: METSI

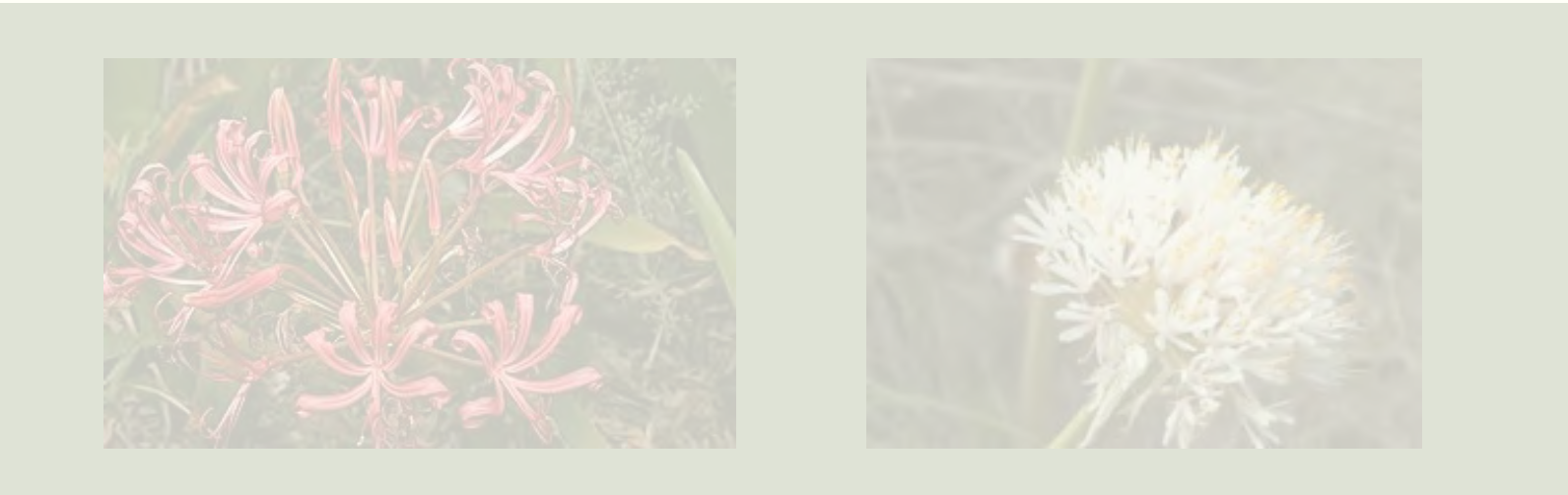


# Phase 1: Controlled cultivation in different soil types

## Potting trial



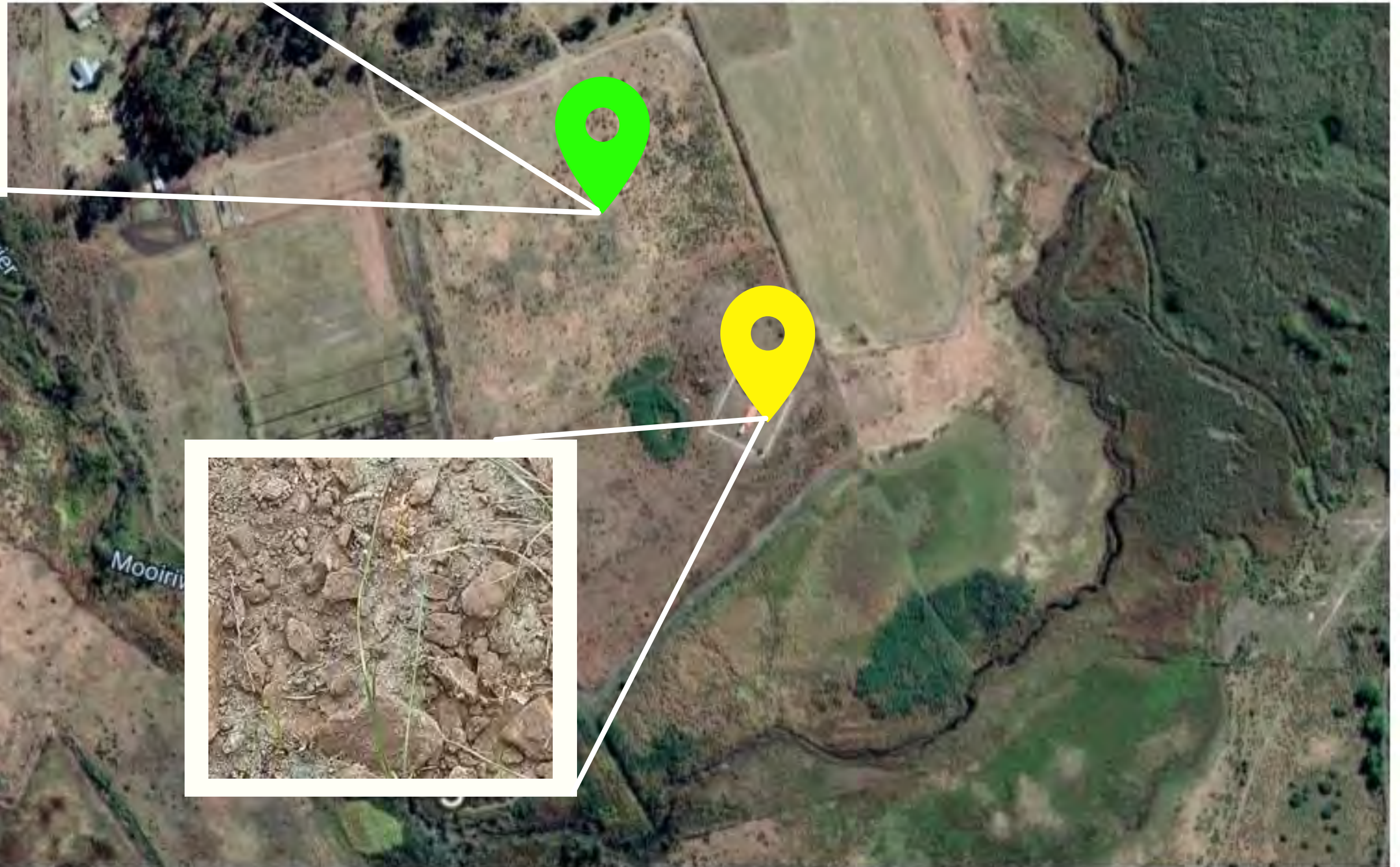
Different Soil types



Species selection



# Phase 1



**Old fields**



**Natural dolomite  
grassland**



# Phase 1



**Old fields**



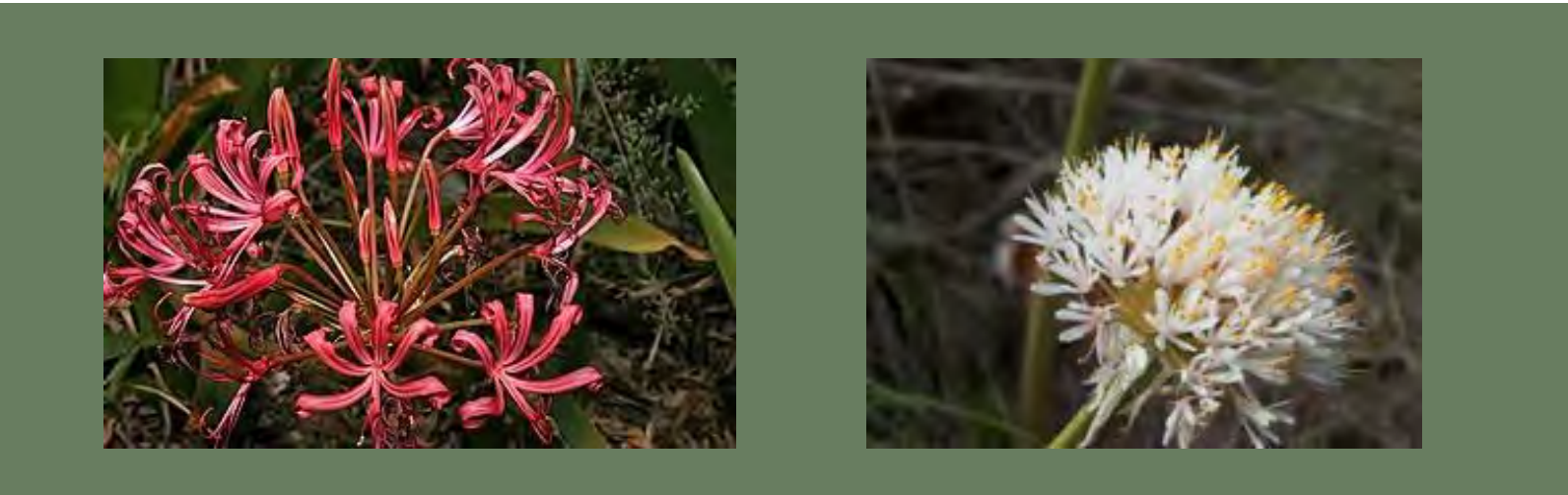
**Natural dolomite  
grassland**

# Phase 1: Controlled cultivation in different soil types

## Potting trial



Different Soil types



Species selection



# Phase 1



## Species selection

*Haemanthus montanus:*

Dolomite grasslands;

Easy to cultivate;

Recalcitrant seeds



*Nerine krigei:*

Damp depressions in grassland;

Copious amounts of seeds;

Recalcitrant seeds





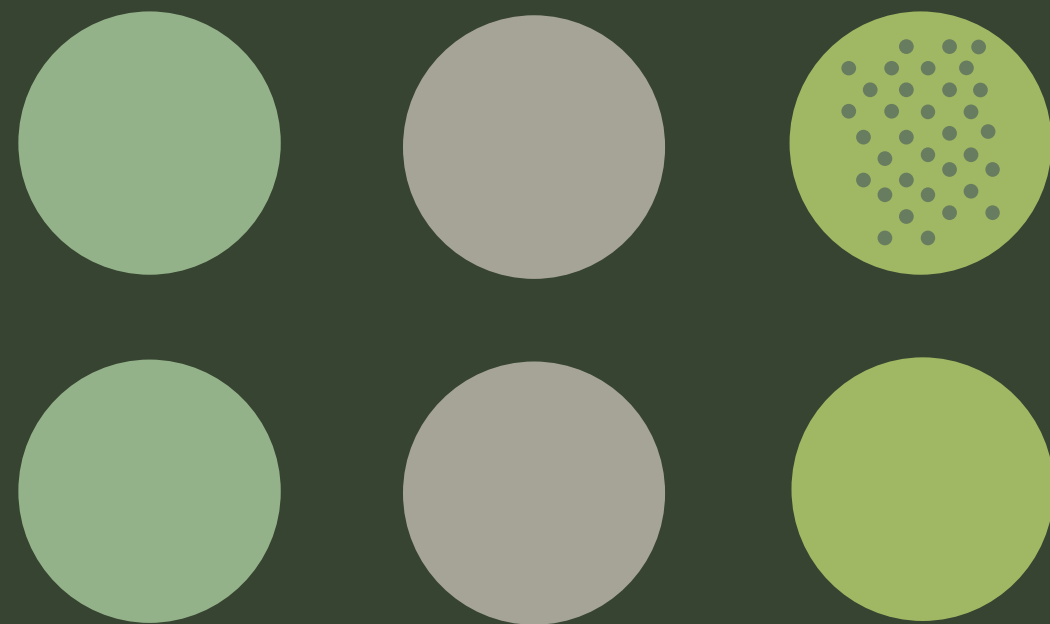
# Experimental design

## *Haemanthus montanus*

2 pots per treatment

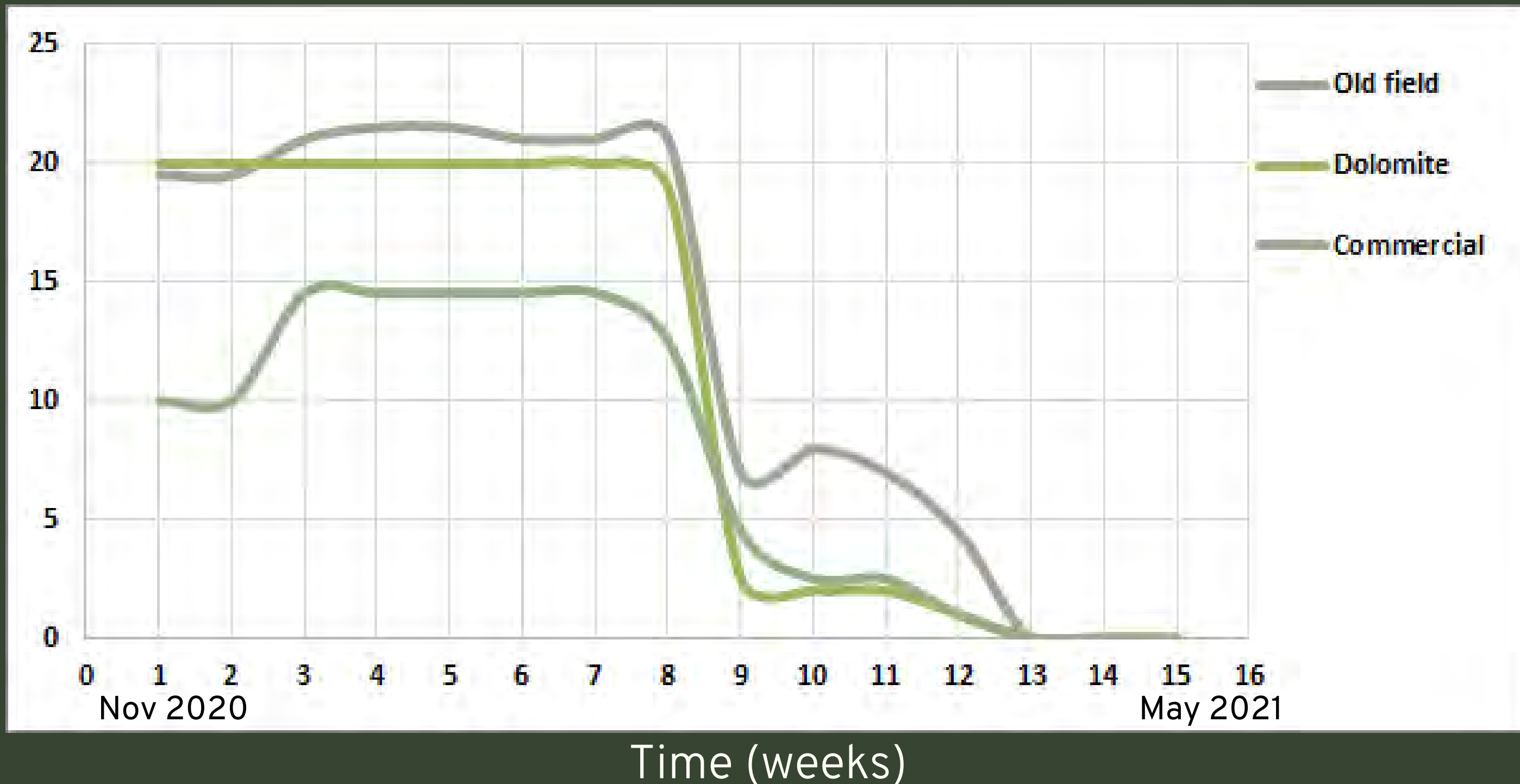
34 seeds per pot

Control Old fields Dolomite



# Preliminary results: *Haemanthus* count

Average number of seedlings

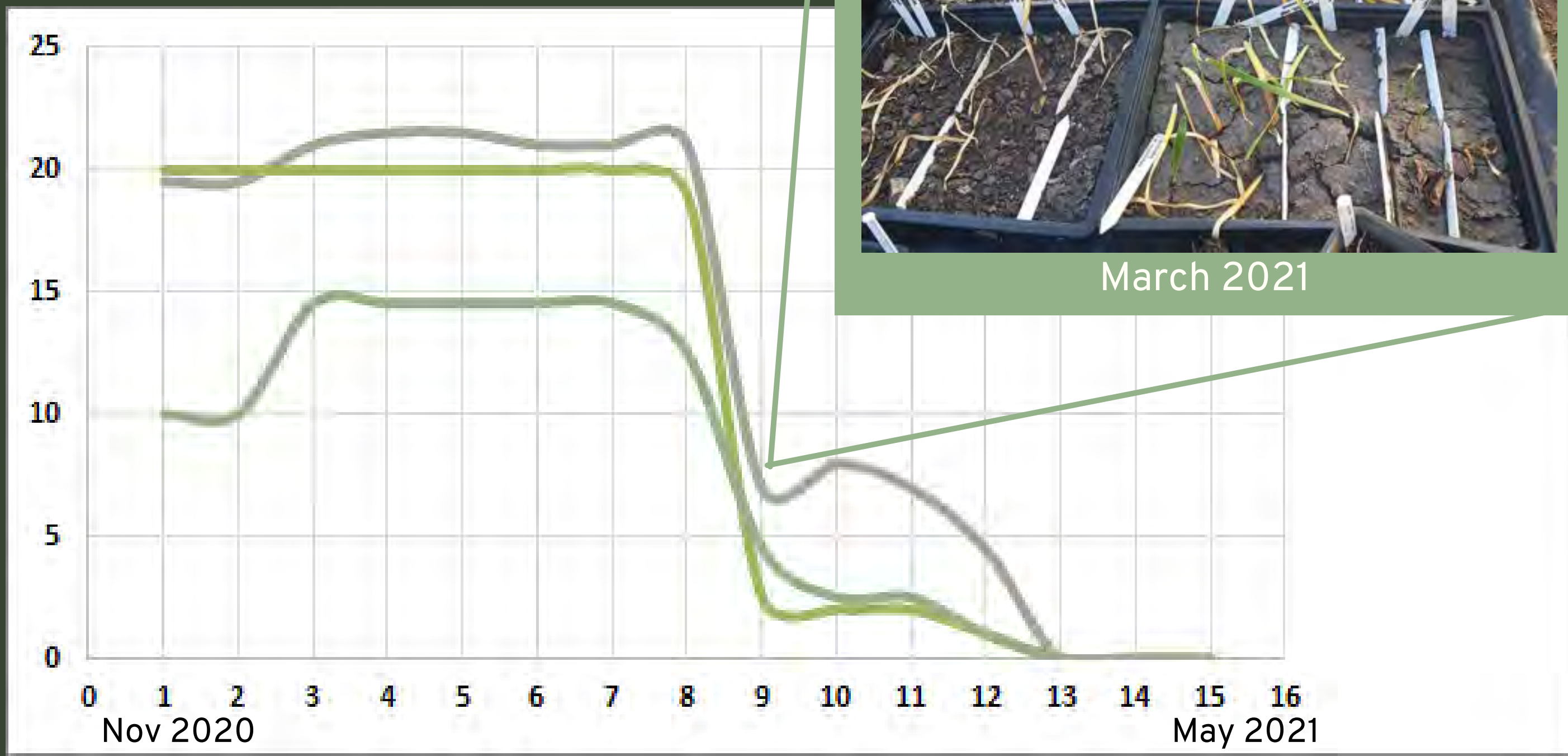


# Preliminary results:



March 2021

Average number of seedlings

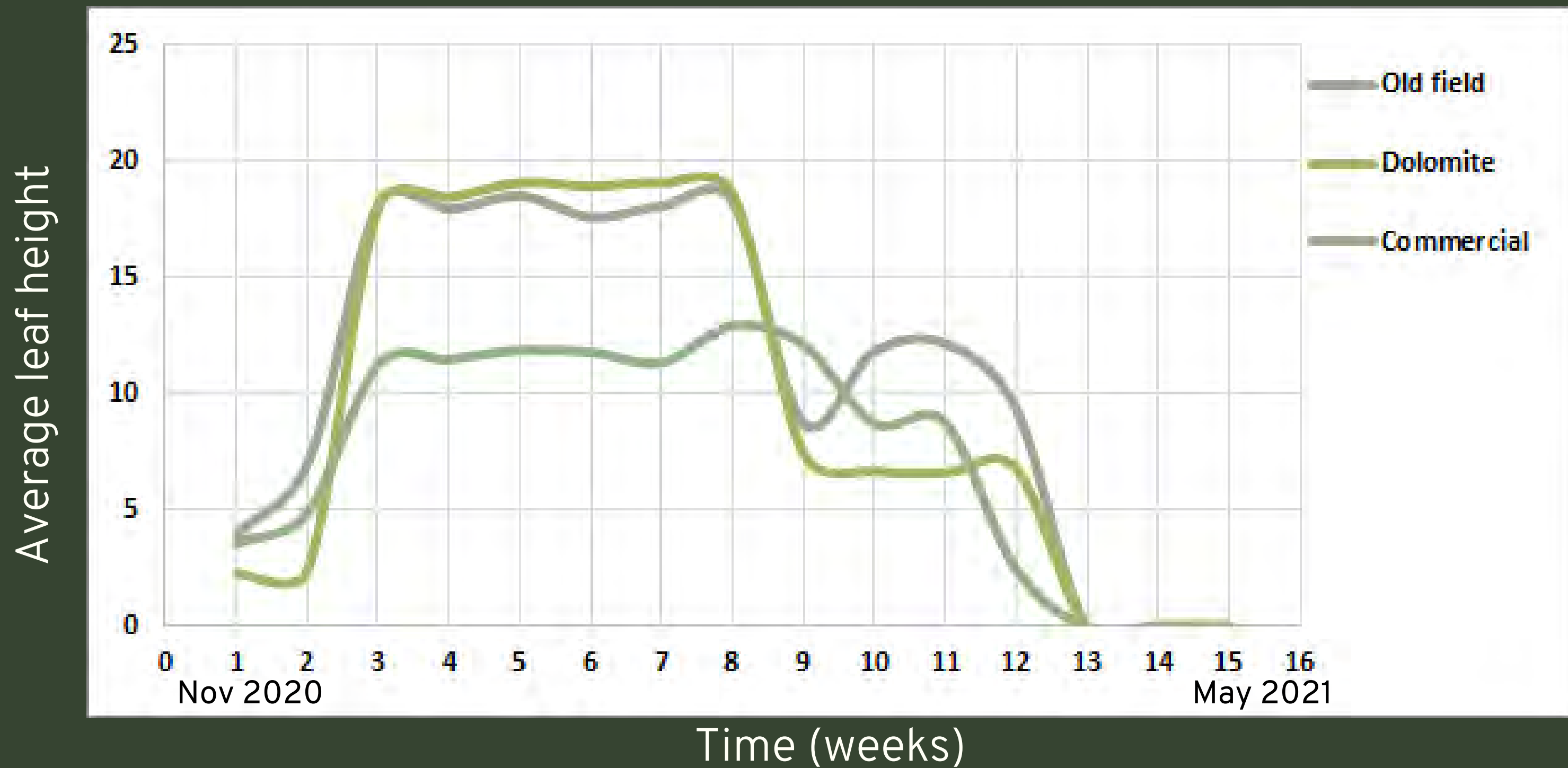


Time (weeks)

Nov 2020

May 2021

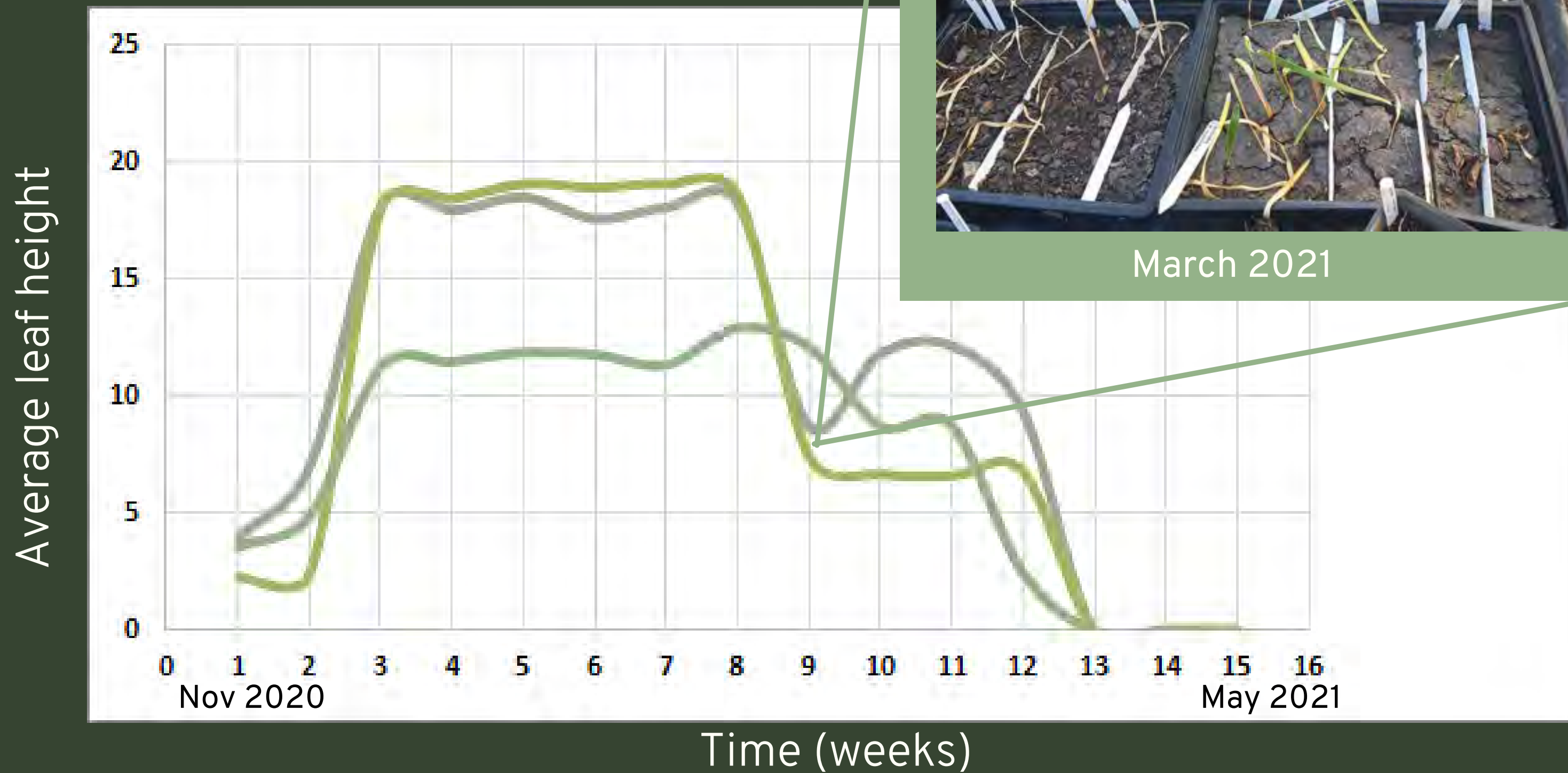
# Preliminary results: *Haemanthus* height



# Preliminary results:



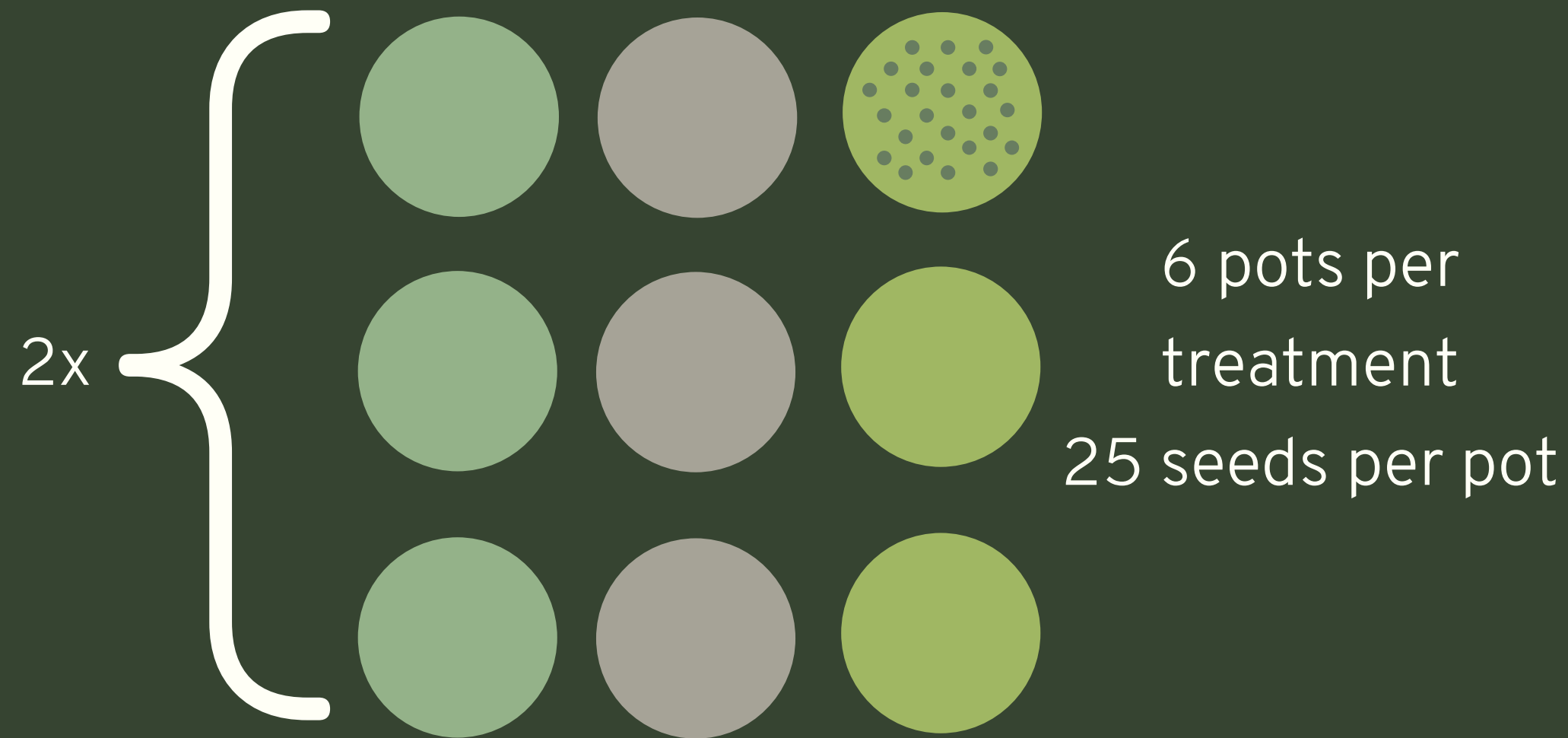
March 2021



# Experimental design

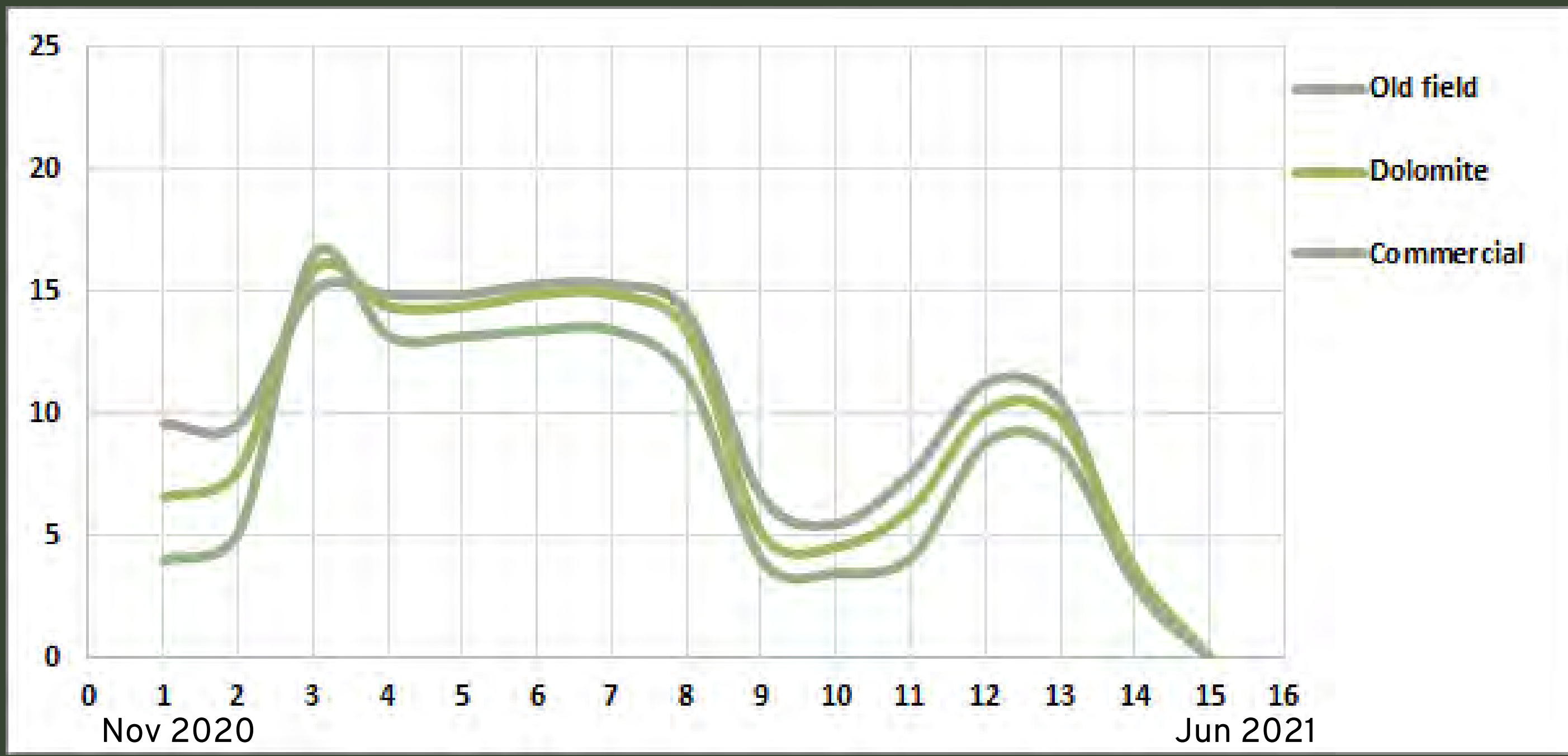
## *Nerine krigei*

Control Old fields Dolomite



# Preliminary results: *Nerine* count

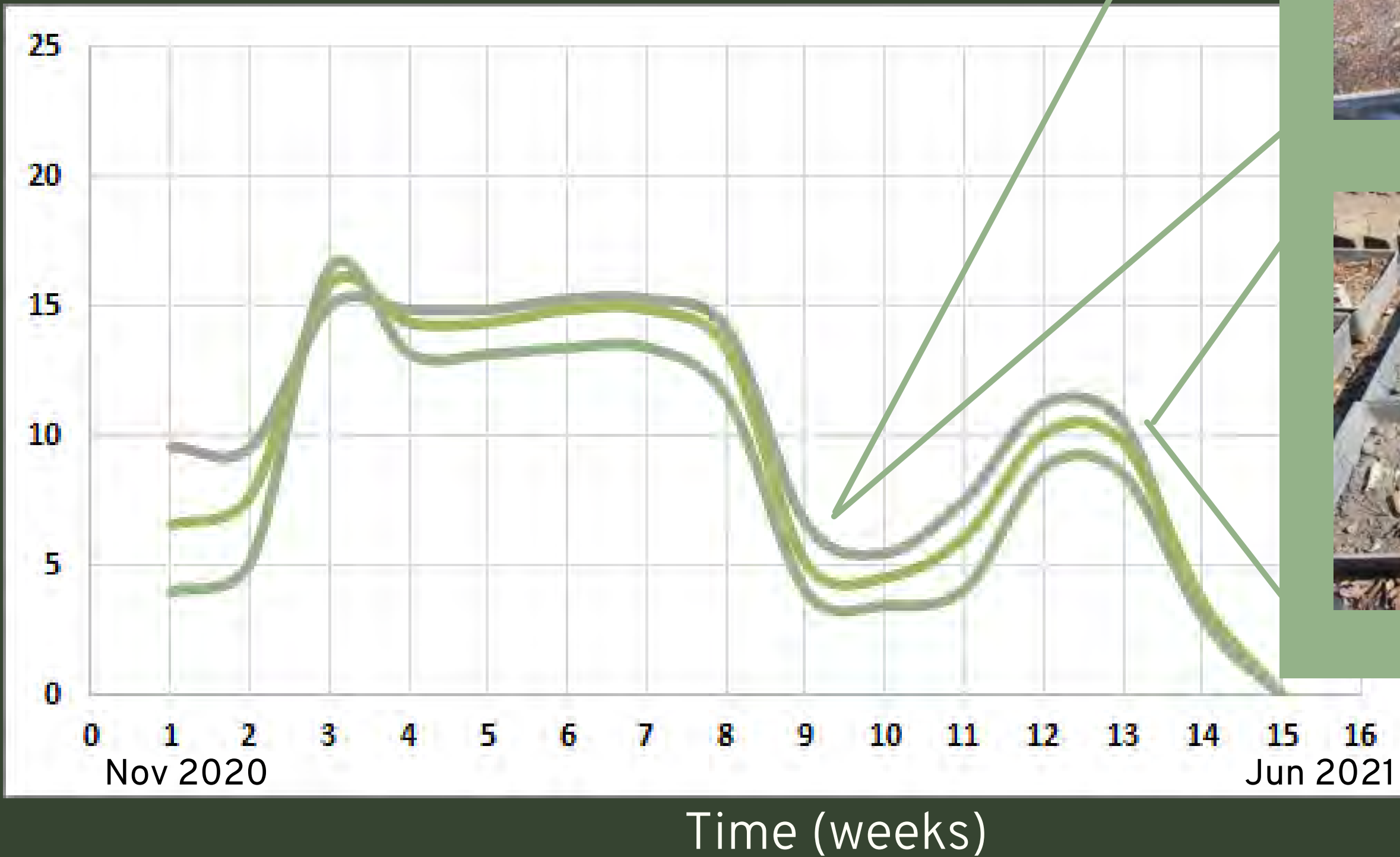
Average number of seedlings



Time (weeks)

# Preliminary results:

Average number of seedlings



March 2021



April 2021



# Preliminary results: *Nerine* count



March 2021



April 2021

# Preliminary results: *Nerine* height



# Preliminary conclusion

>60% germination success

Current growth:

*Nerine* and *Haemanthus* doing better in dolomite and old field soil compared to commercial soil.

Good news:

Expected to do well in dolomite soil (natural). Doing well in old field soil – good news for assisted reintroductions.



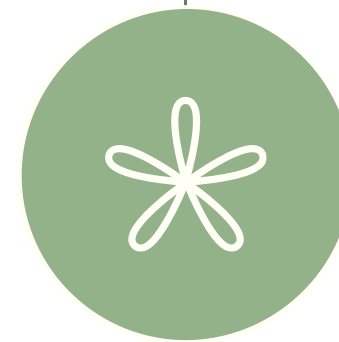
# Parallel study: *Crinum bulbispermum* on mine tailings

(GeoEco Lab)

## Potting trial



Different Soil types



Species selection



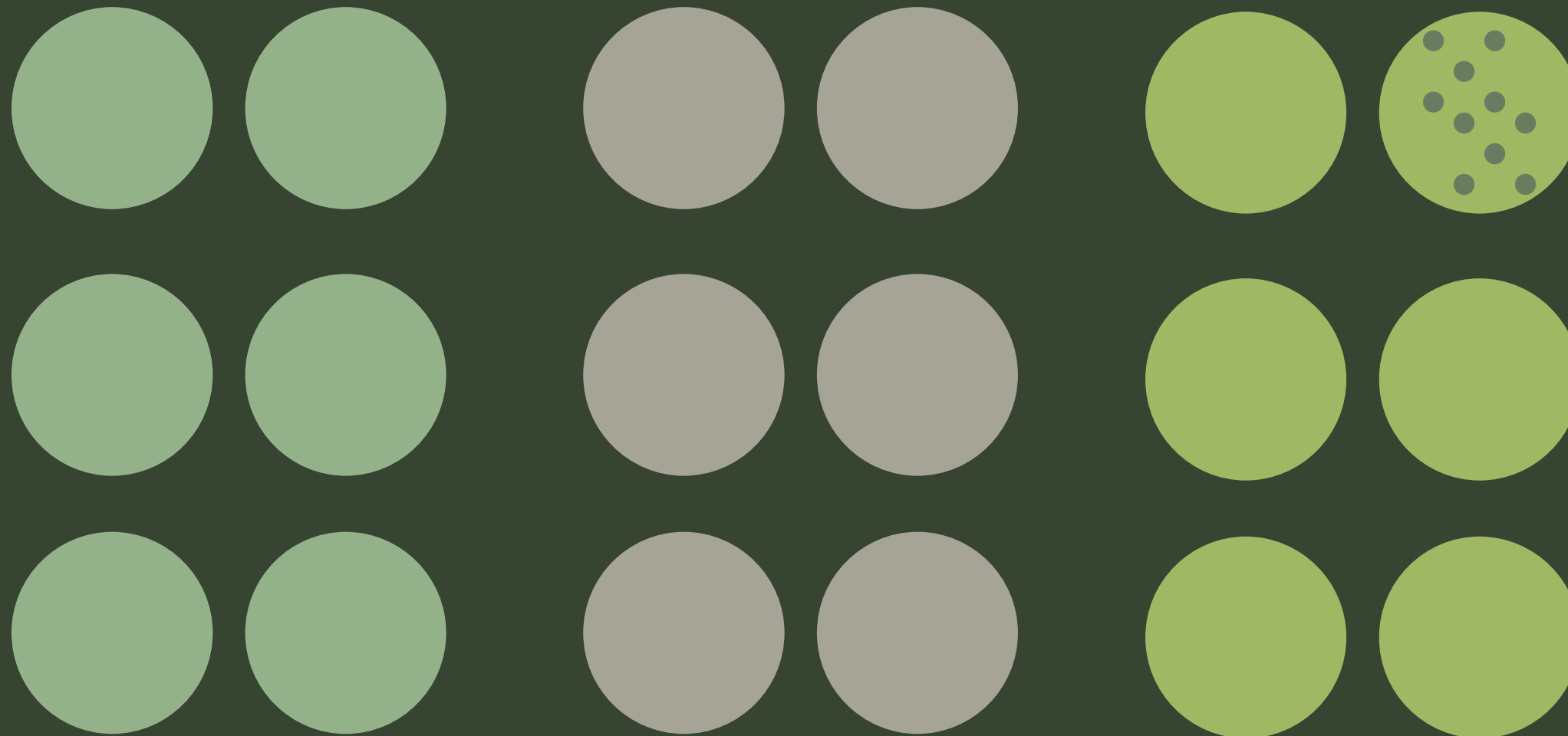
# Experimental design

Control

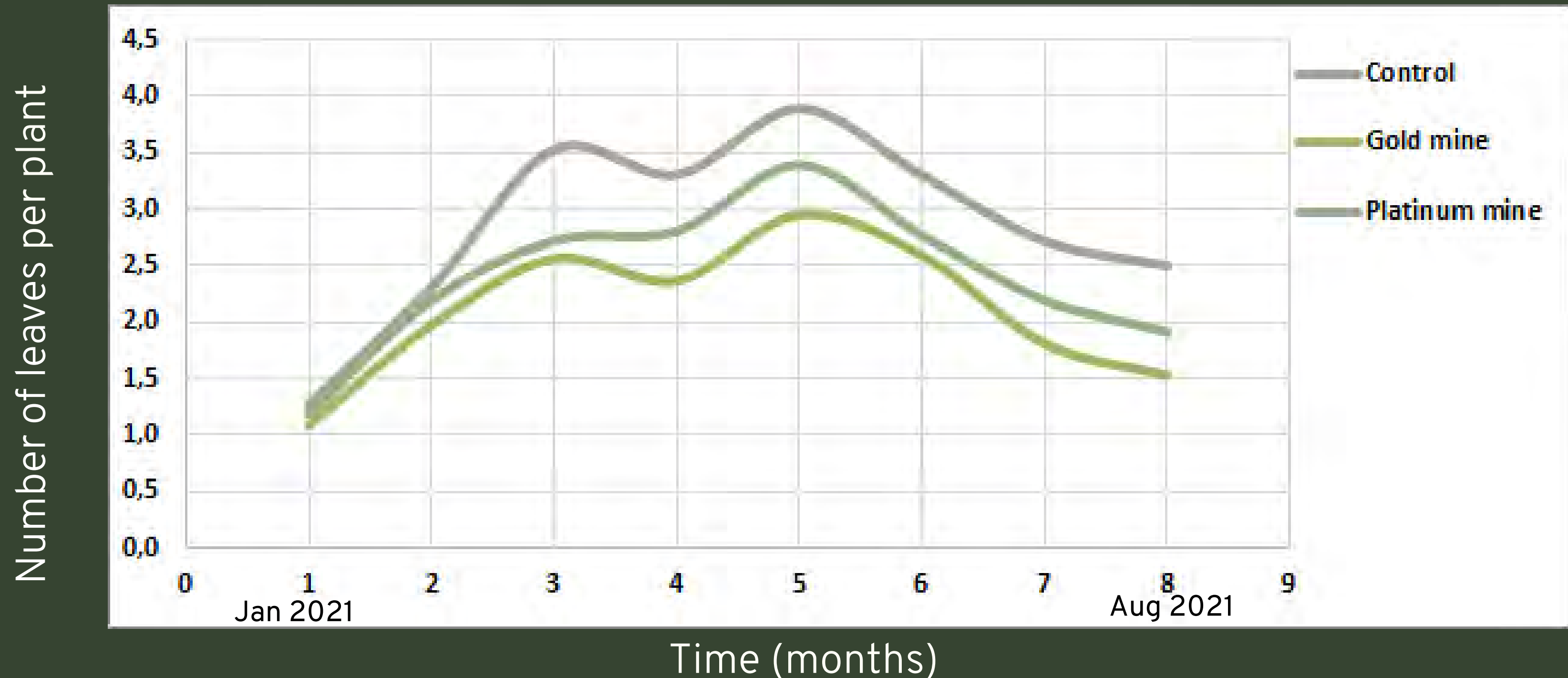
Platinum

Gold

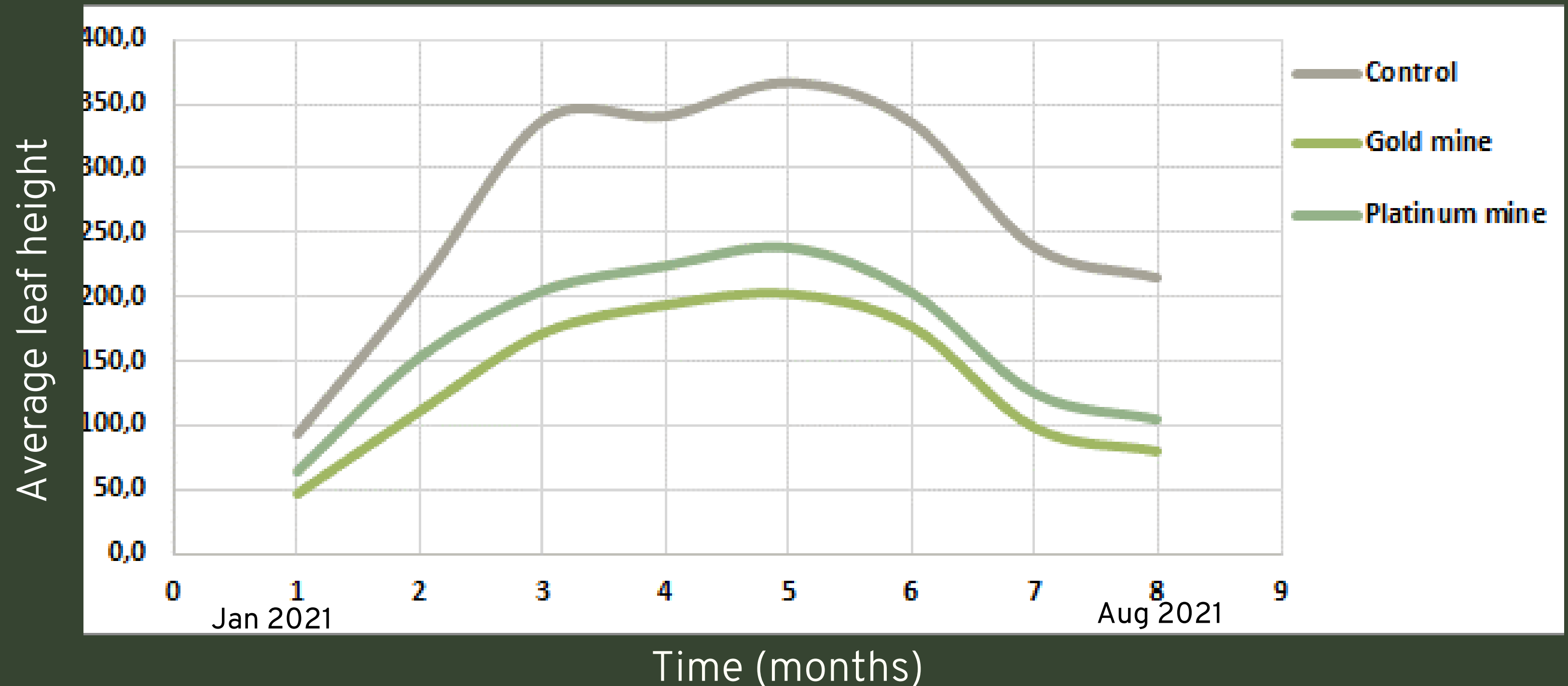
6 pots per treatment  
10 seeds per pot



# Preliminary results: *Crinum* leaf count



# Preliminary results: *Crinum* height



# Preliminary conclusion

>95% germination success

Current growth:

Crinum doing better in  
commercial soil mixture  
compared to mining soil.

Good news:

Still got them growing





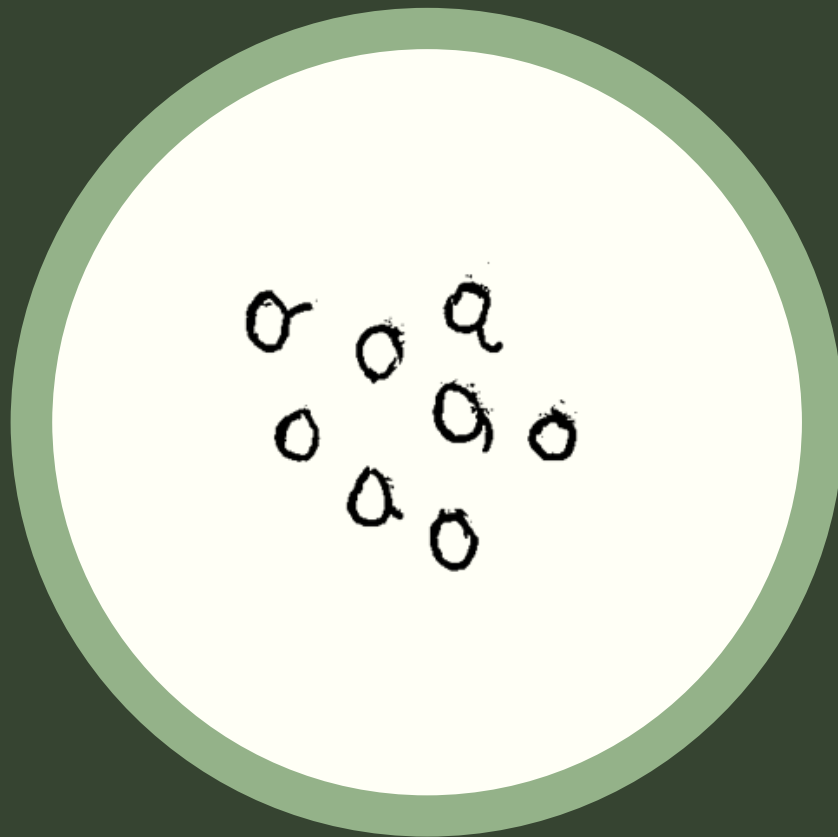
# Conclusions after reconnaissance

Geophytes grow better than expected on both ploughed and mined fields



## Phase 2: Reintroduction

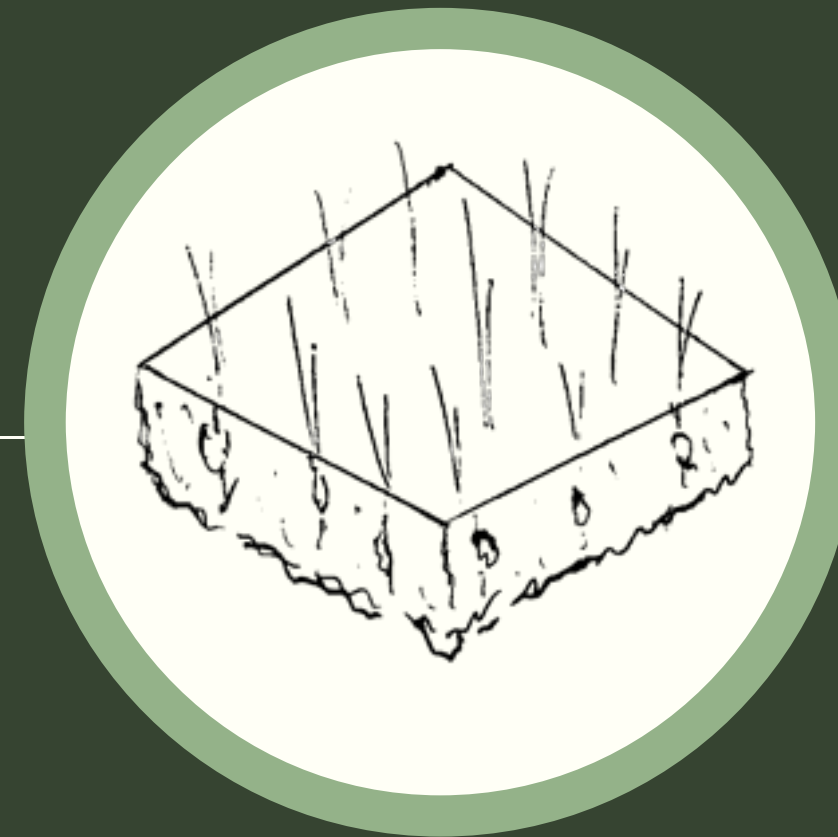
Next steps:



SEEDS



SEEDLINGS



SODS



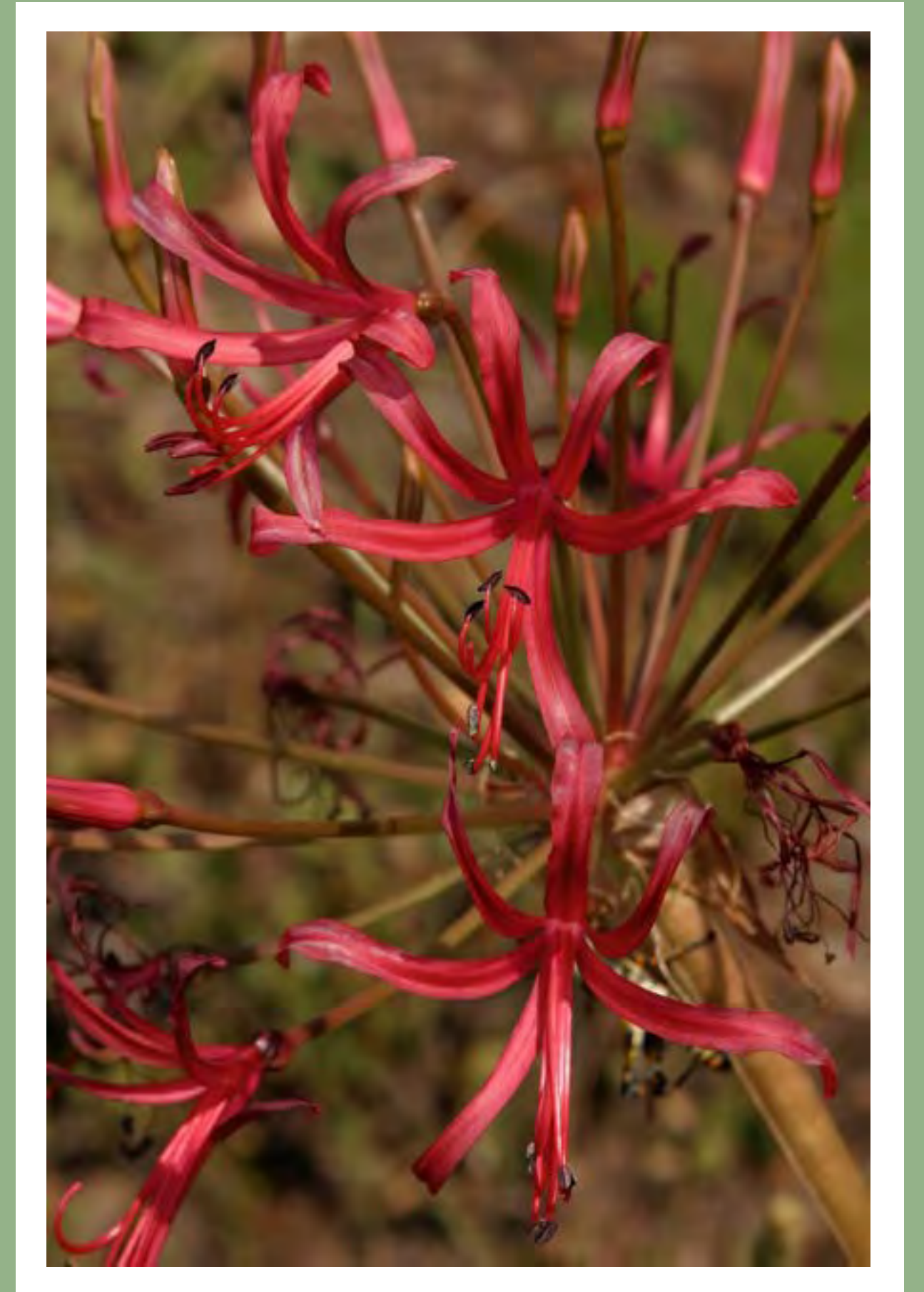
# THANK YOU

## REFERENCE LIST

Bond, W. J., & Parr, C. L. (2010). Beyond the forest edge: Ecology, diversity and conservation of the grassy biomes. *Biological Conservation*, 143(10), 2395–2404.  
<https://doi.org/10.1016/j.biocon.2009.12.012>

Buisson, E., Fidelis, A., Overbeck, G. E., Schmidt, I. B., Durigan, G., Young, T. P., Alvarado, S. T., Arruda, A. J., Boisson, S., Bond, W., Coutinho, A., Kirkman, K., Oliveira, R. S., Schmitt, M. H., Siebert, F., Siebert, S. J., Thompson, D. I., & Silveira, F. A. O. (2021). A research agenda for the restoration of tropical and subtropical grasslands and savannas. *Restoration Ecology*, 29(S1), 1–18.  
<https://doi.org/10.1111/rec.13292>

Silveira, F. A. O., Arruda, A. J., Bond, W., Durigan, G., Fidelis, A., Kirkman, K., Oliveira, R. S., Overbeck, G. E., Sansevero, J. B. B., Siebert, F., Siebert, S. J., Young, T. P., & Buisson, E. (2020). Myth-busting tropical grassy biome restoration. *Restoration Ecology*, 28(5), 1067–1073.  
<https://doi.org/10.1111/rec.13202>





# THANK YOU

## IMAGES

Slide 1 & 12: <http://portugal.inaturalist.org/taxa/590570-Nerine-krigei>

Slide 2: <https://wildflownursery.co.za/indigenous-plant-database/haemanthus-montanus/>

Slide 3: <https://www.news24.com/news24/southafrica/news/new-land-court-to-have-exclusive-jurisdiction-over-land-reform-disputes-arising-from-expropriation-20210410>

Slide 4: [http://www.waldeneffect.org/blog/Turning\\_old\\_fields\\_back\\_into\\_pastures/](http://www.waldeneffect.org/blog/Turning_old_fields_back_into_pastures/)

Slide 5: [https://www.freepik.com/premium-photo/agriculture-hand-planting-seeds-red-beans-soil\\_2627261.htm](https://www.freepik.com/premium-photo/agriculture-hand-planting-seeds-red-beans-soil_2627261.htm)

Slide 7 & 8: <http://pza.sanbi.org/crinum>

Images not included in this list: Clarissa Minnaar

