Changing Properties of Compost For Restoring Post-Industrial Sites To Habitats of Conservation Value

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The Problem

Blaenau Ffestiniog in Snowdownia National Park, Wales

Site for Restoration

Waste tip prior to experimental start

Target Vegetation

Acid Heathland –
Calluna vulgaris,
(Heather)
Erica tetralix,
V. myrtilis

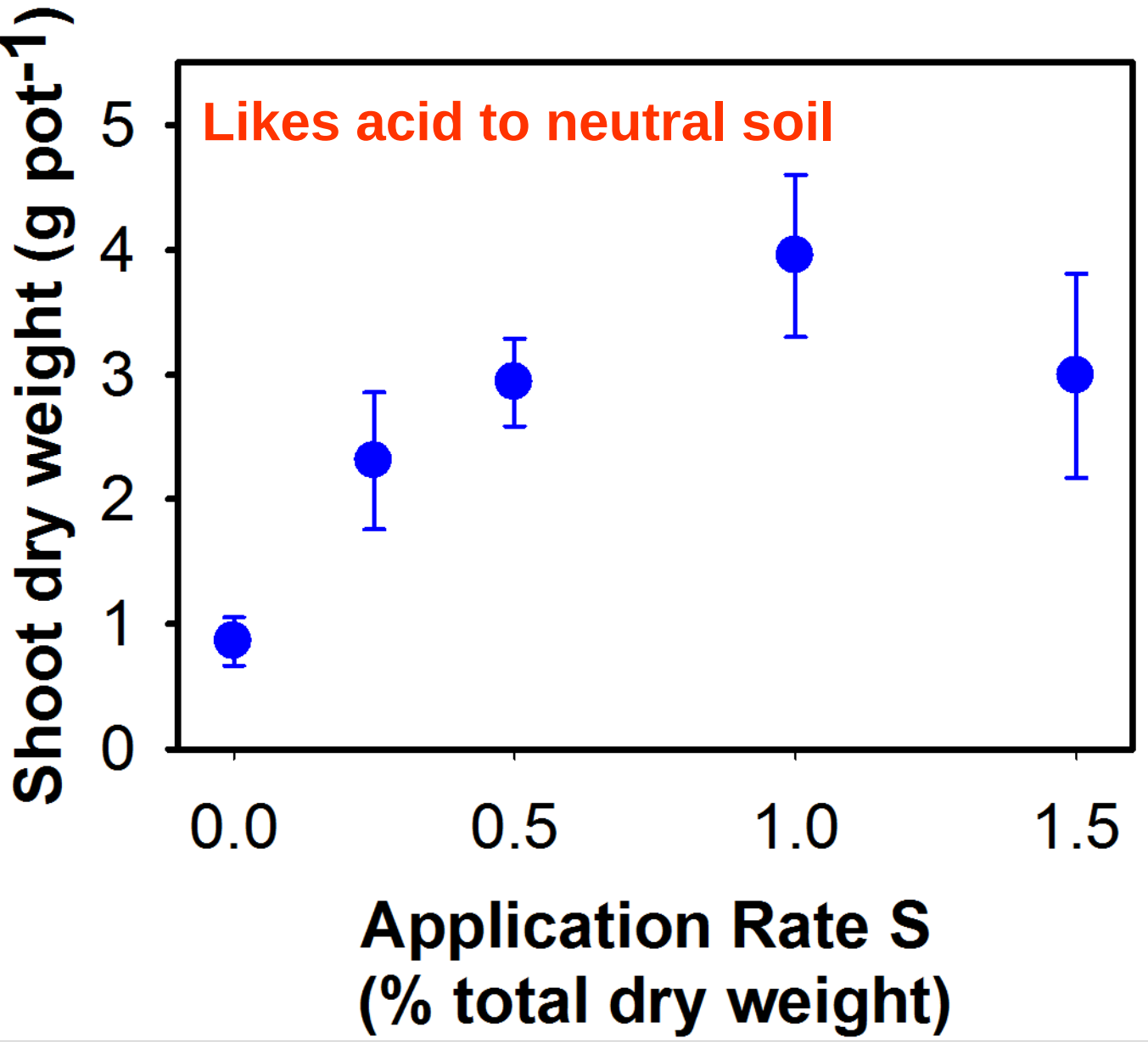
Problems with Compost

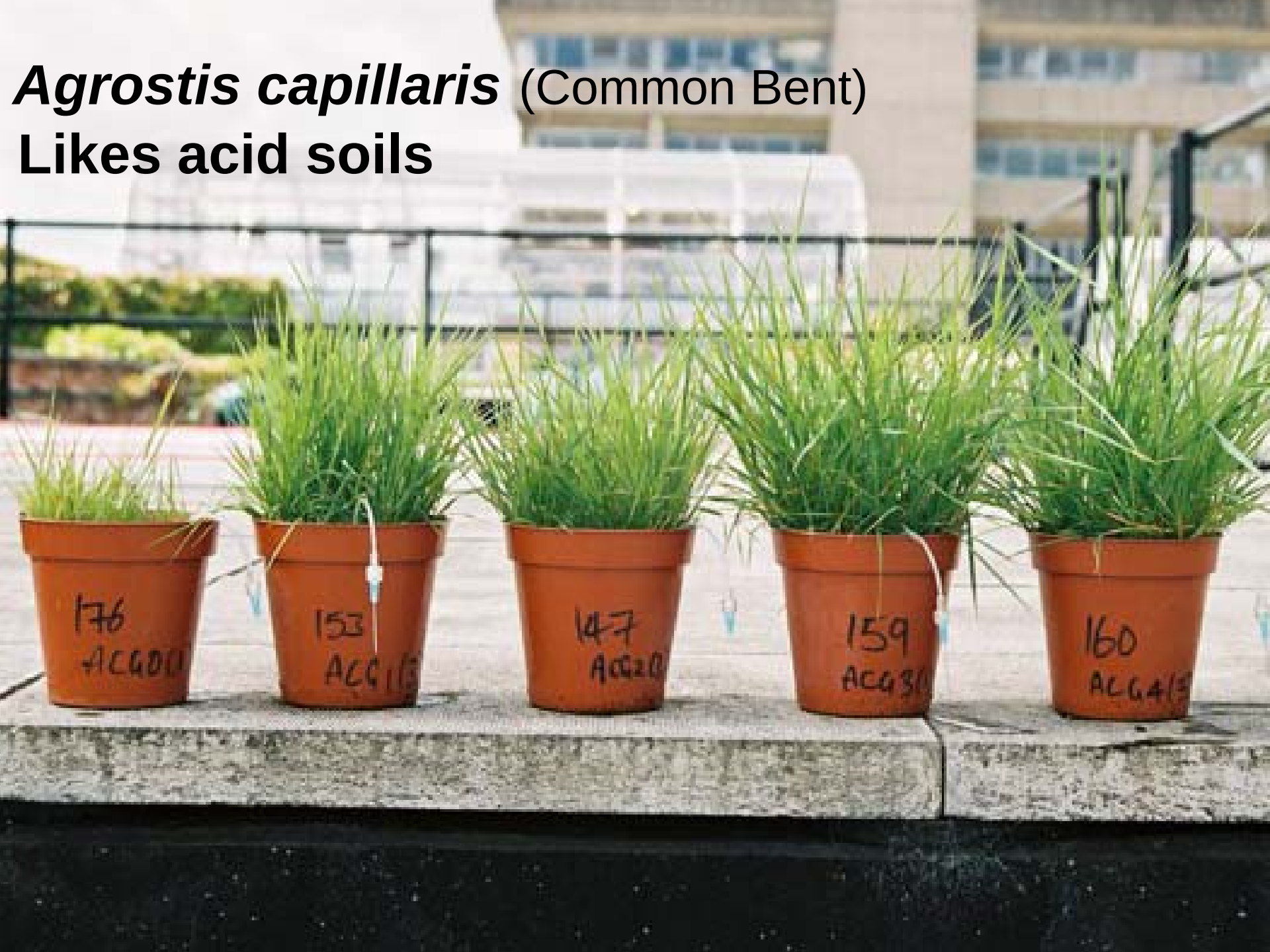
	Compost	Heathland
pH	7 – 8	3 – 5
P (Olsen)	200 mg kg^{-1}	20 mg kg^{-1}
Total N	1 %	0.6 %

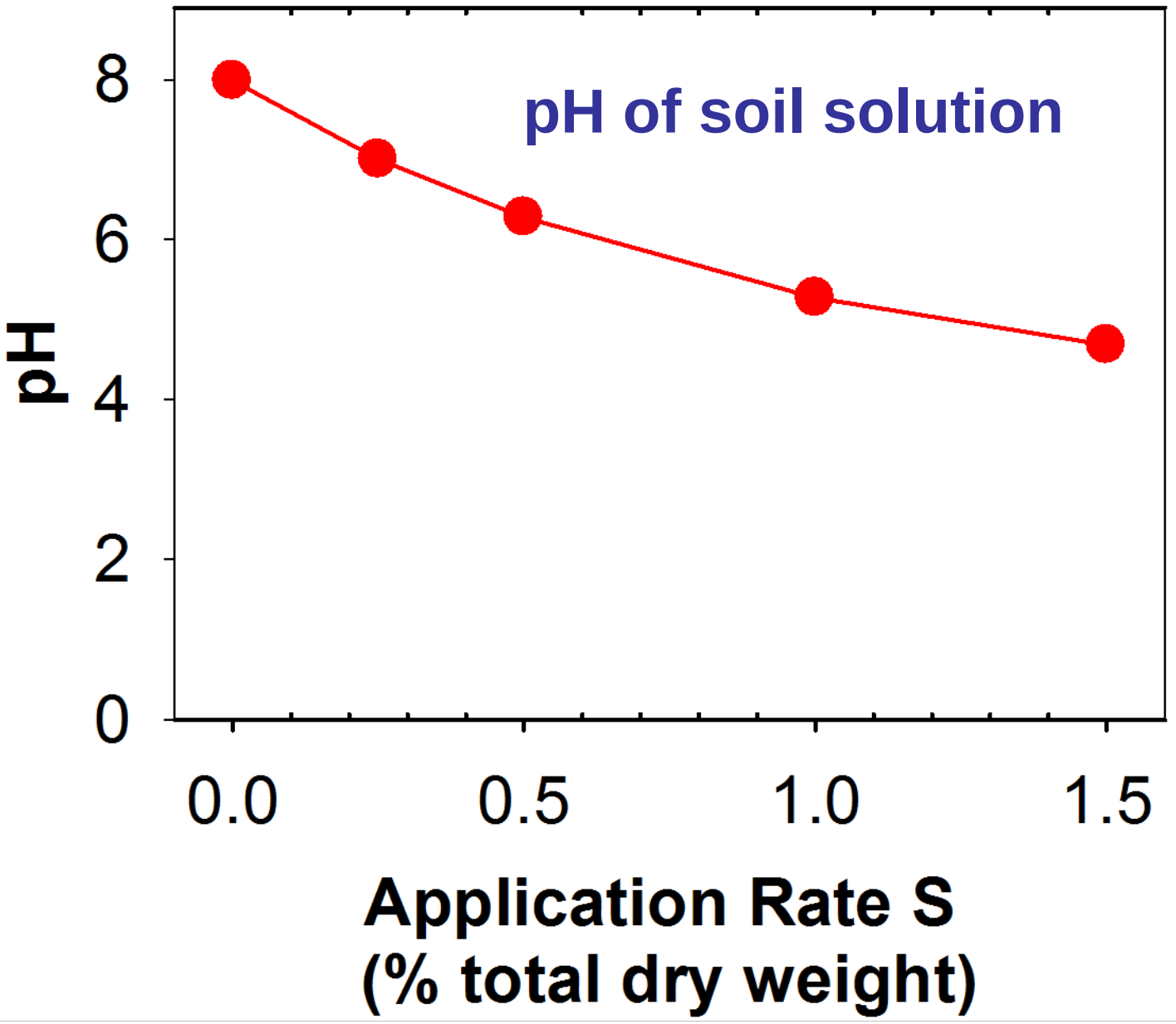
Acidification: Pot Trial

- **5 species:** *Agrostis capillaris*, *Calluna vulgaris*, *Dactylis glomerata*, *Deschampsia flexuosa*, *Lolium perenne*
- **Compost:** green-waste, peat free multi-purpose, peat based
- **5 rates of sulphur:** 0, 0.25, 0.5, 1.0, 1.5 % of compost dry weight

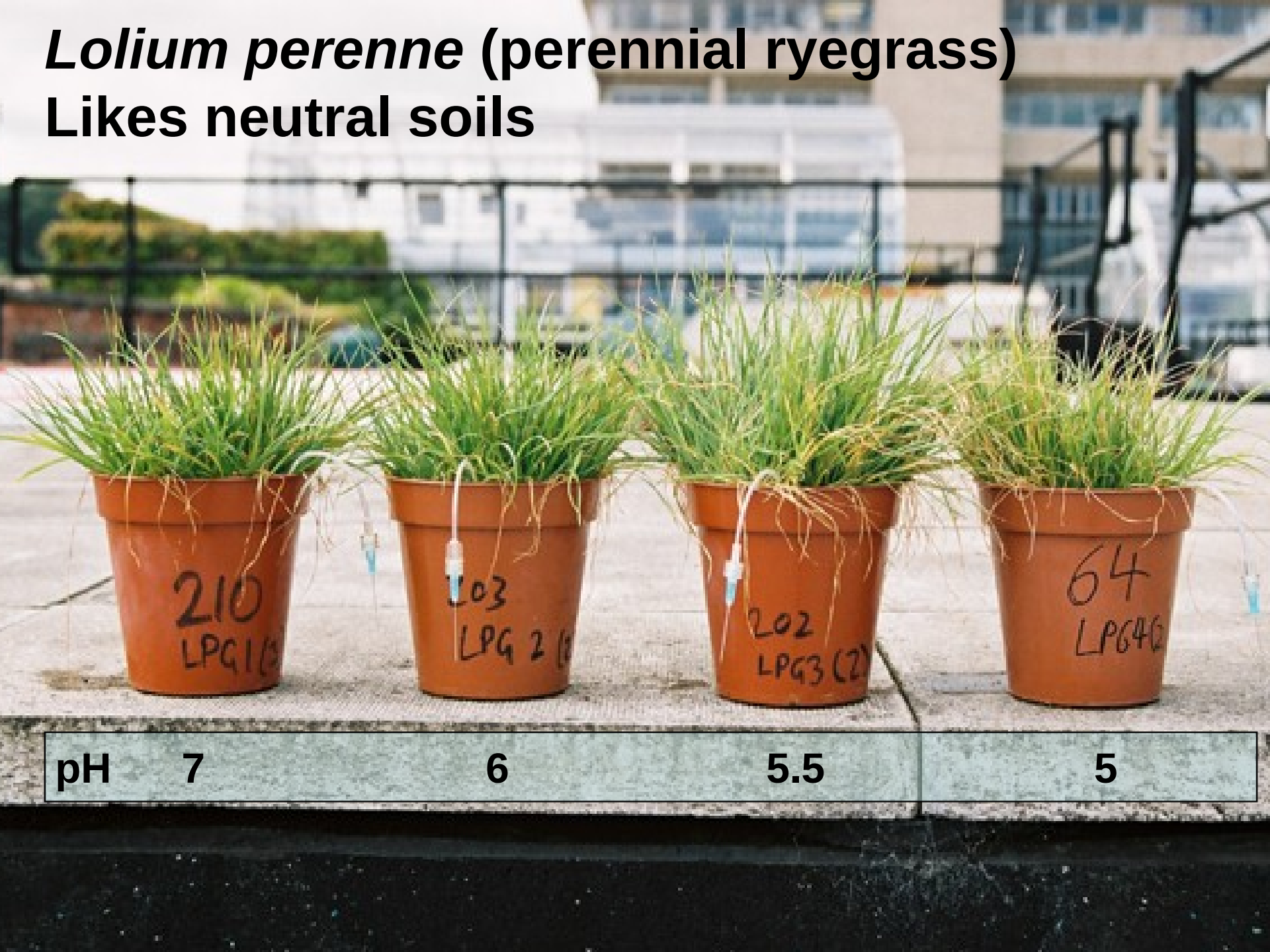
Agrostis capillaris Shoot Dry Weight

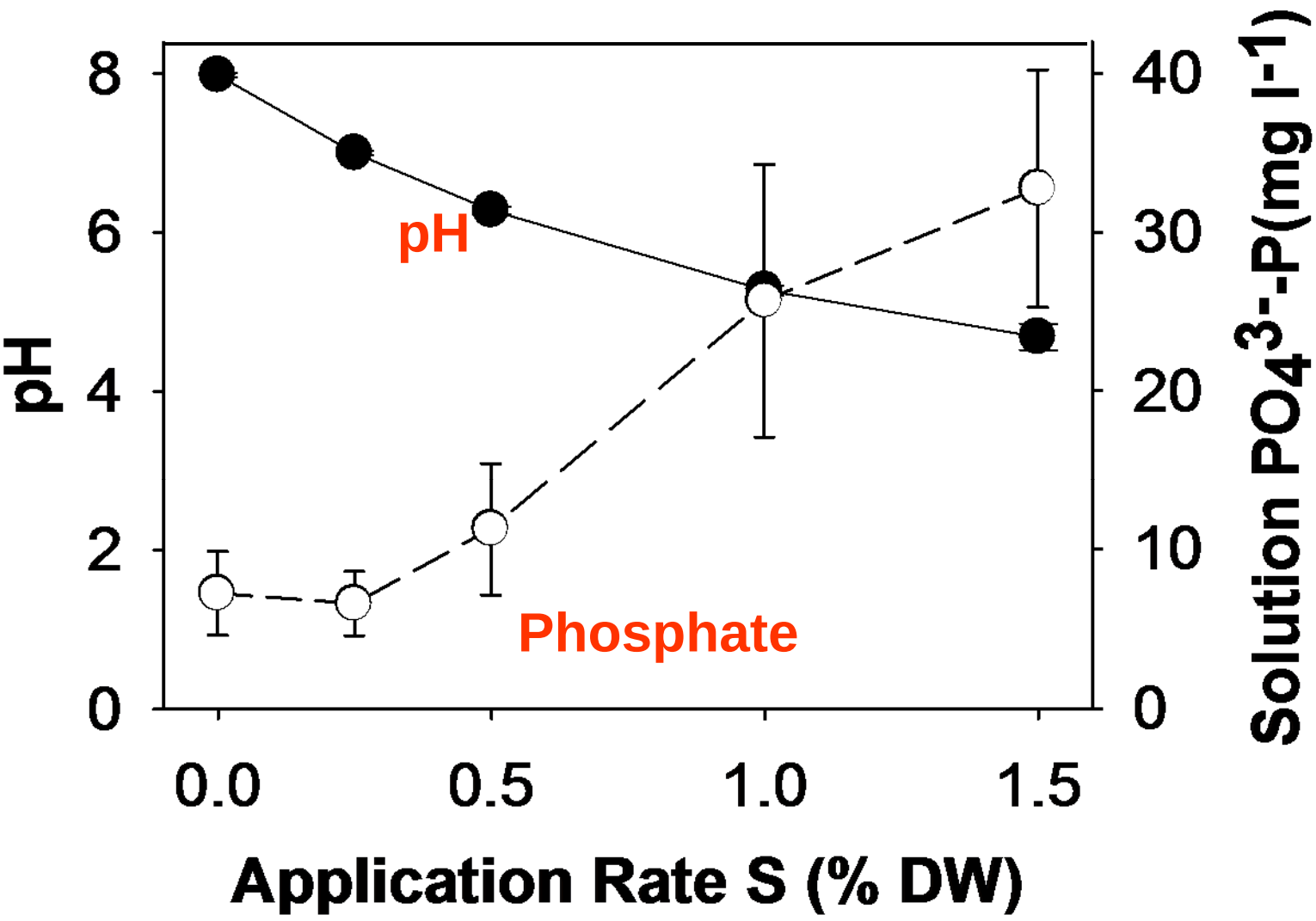


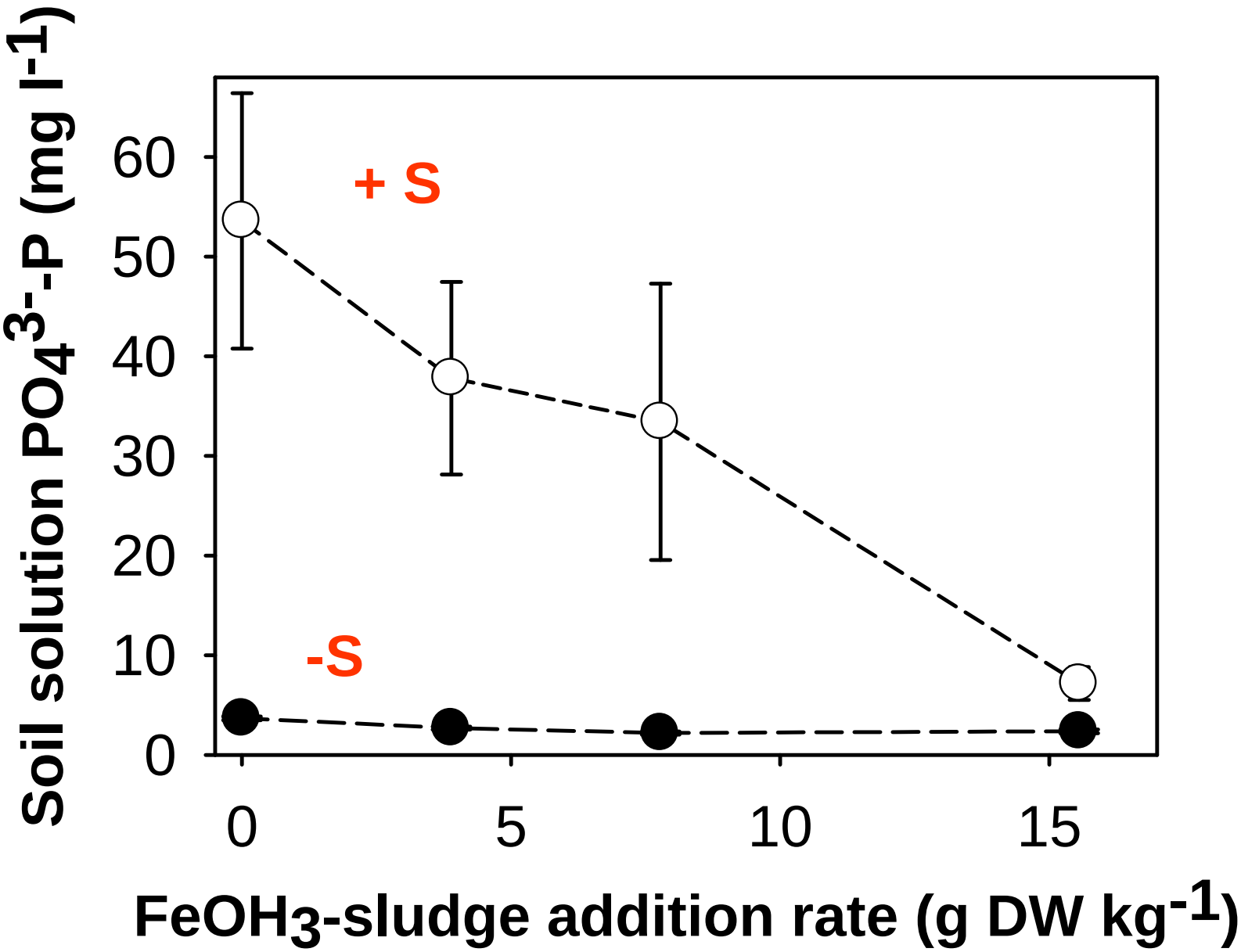

Agrostis capillaris (Common Bent)
Likes acid soils


pH of soil solution
pH
8
6
4
2
0
0.0
0.5
1.0
1.5
Application Rate S
(% total dry weight)

***Lolium perenne* (perennial ryegrass)**
Likes neutral soils




pH
Phosphate
pH
Solution PO4 3- -P(mg l-1)
Application Rate S (% DW)
0
2
4
6
8
0
10
20
30
40
0.0
0.5
1.0
1.5


Soil solution PO_4^{3-}-P (mg l^{-1})
60
50
40
30
20
10
0
+ S
-S
0
5
10
15
$FeOH_3$-sludge addition rate (g DW kg^{-1})

Putting it into Practice

- Compost mixes:

  45% Greenwaste, 15% Sewage, 40% Paper sludge

  45% Greenwaste, 15% Sewage, 40% Slate Sand

- Both paper sludge and slate sand contain little N or P. Investigate if paper locks up more N and P (unavailable) than the dilution effect of slate fines

Diluting Nutrients

- Although we diluted nutrients during composting by using slate sand or paper, the compost was still too rich for acid heathland vegetation.

- Each compost was mixed 50:50 with fresh paper sludge to try to mop up nutrients

- The undiluted composts were compared to the diluted composts and paper sludge alone for this trial

Compost Treatments

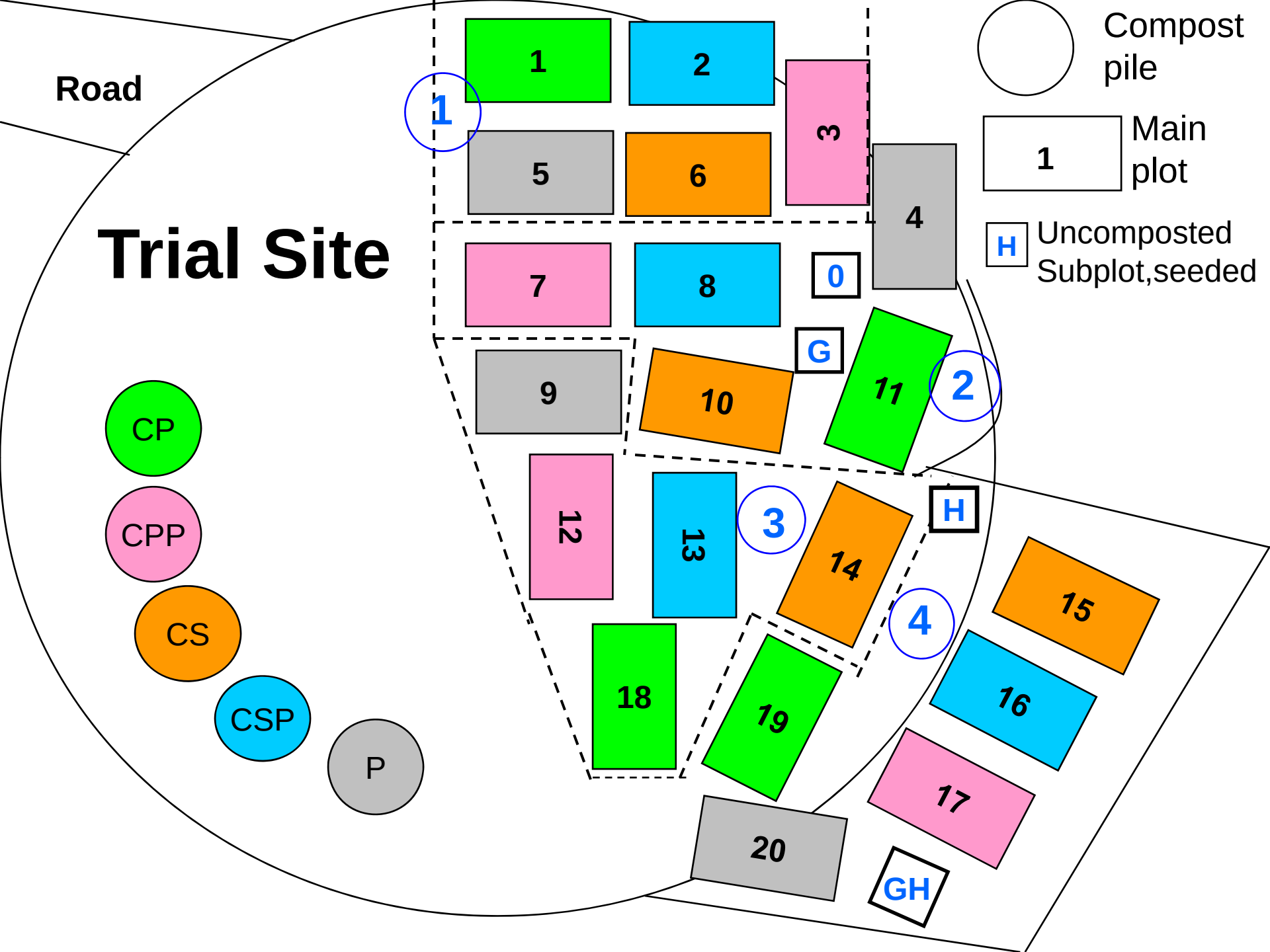
CP = green waste + biosolids + paper fibre

CPP = green waste + biosolids + paper fibre: un-composted paper fibre (50: 50 by DW)

CS = green waste + biosolids + slate sand

CSP = green waste + biosolids + slate sand: un-composted paper fibre (50: 50 by DW)

P = un-composted de-inking paper fibre only


Road
Trial Site
Compost pile
1
Main plot
H
Uncomposted Subplot,seeded
CP
CPP
CS
CSP
P
1
2
3
4
5
6
7
8
0
G
9
10
11
2
12
13
3
14
H
4
15
16
17
18
19
20
GH

Landforming

The waste tip was landformed to follow the contours of the mountain

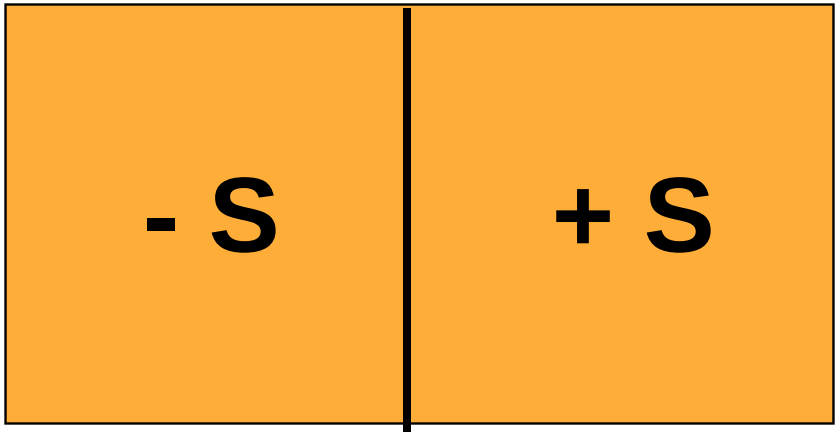
Compost Spreading

Spreading compost plots

Finished plots from hillside

Other Treatments: pH

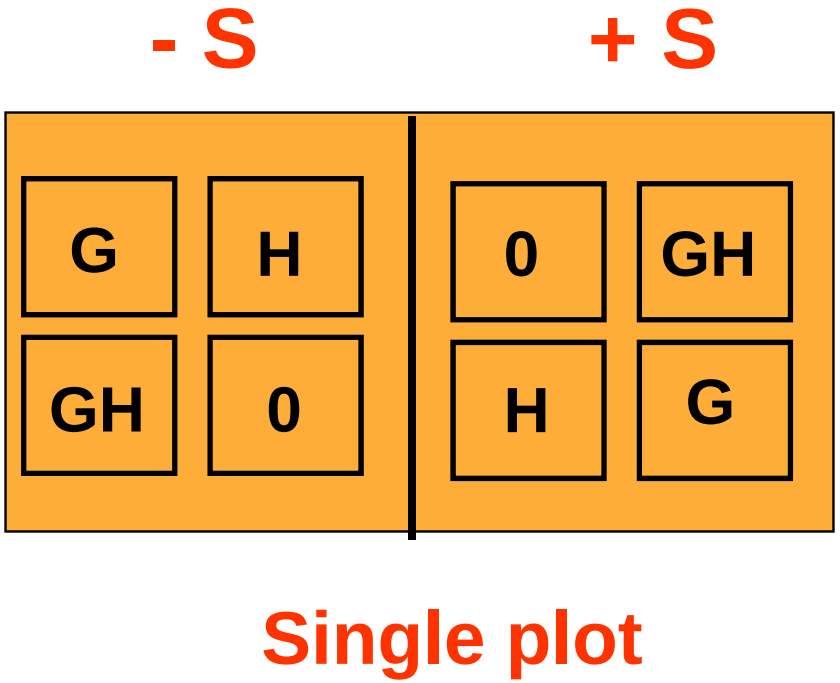
- Based on pot experiments added 0.75% S to half of each plot to lower the pH. Waste S from oil refinery.
- Could not add FeOH rich waste to counter effect of available P, due to regulations.



Single plot

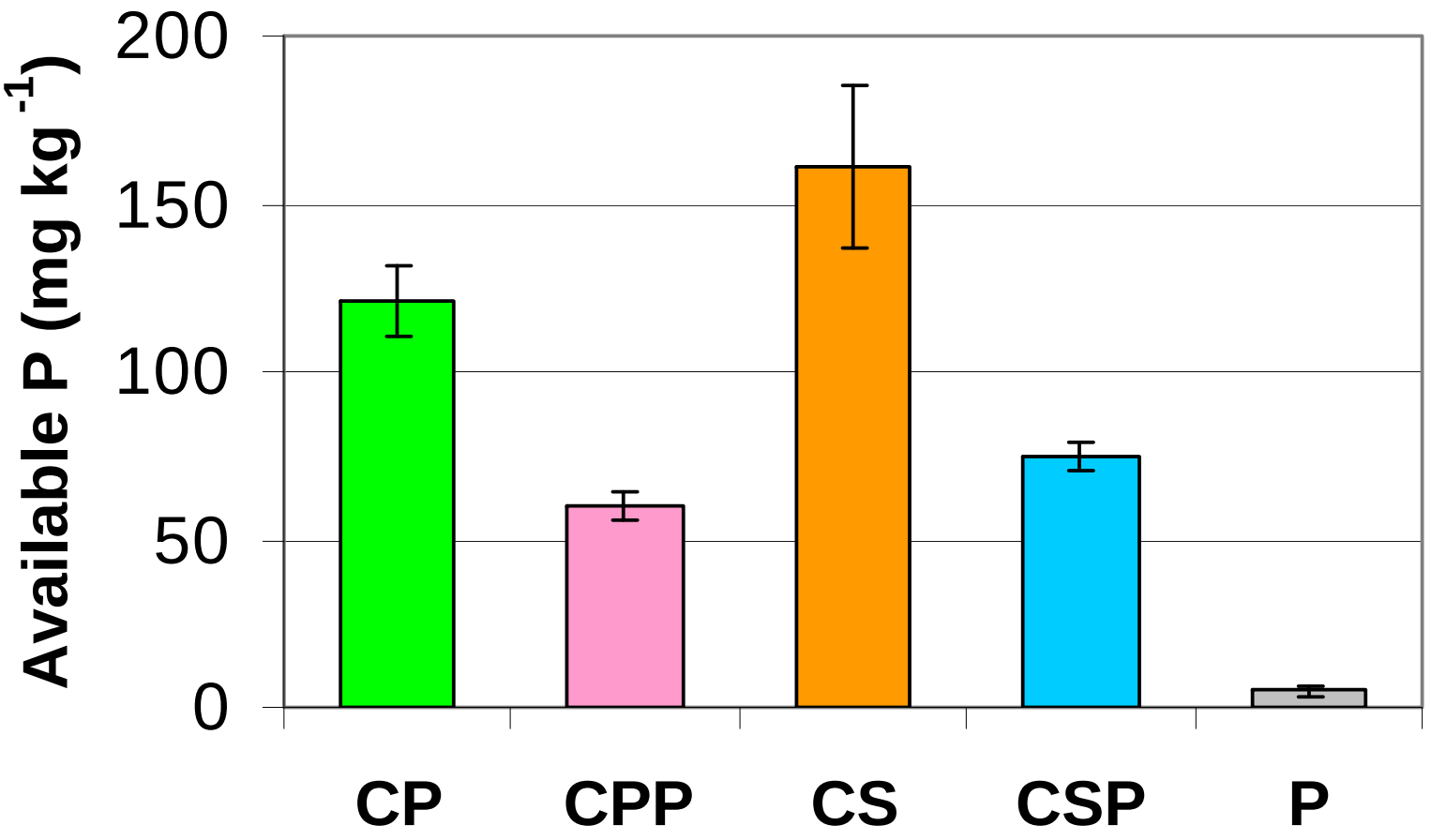
Other Treatments: Seed

- **Vegetation Establishment:**
  - Heather
  - Grass (acid loving)
  - Heather + Grass
  - No seed
- Grass thought to act as nurse crop for heather

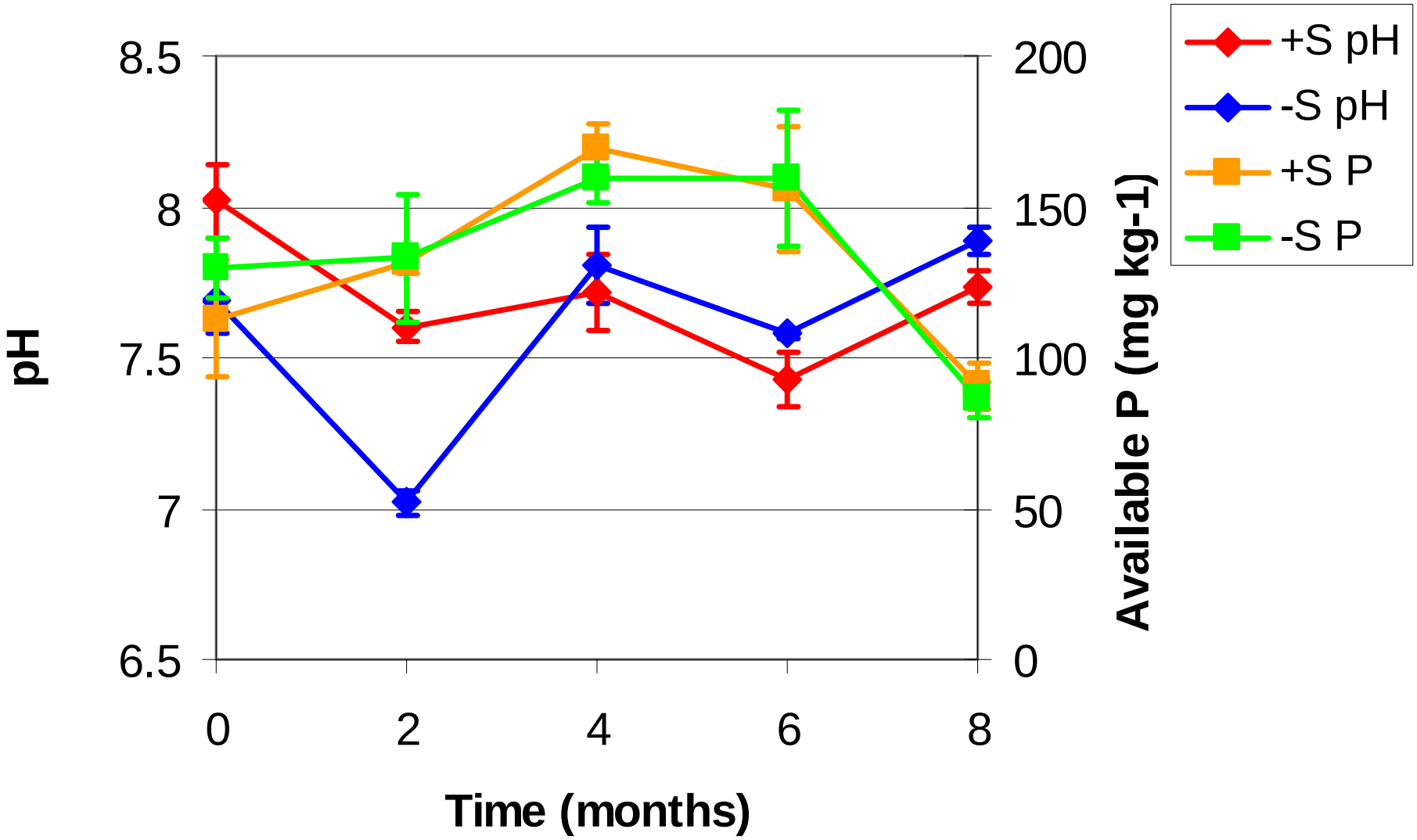


Single plot

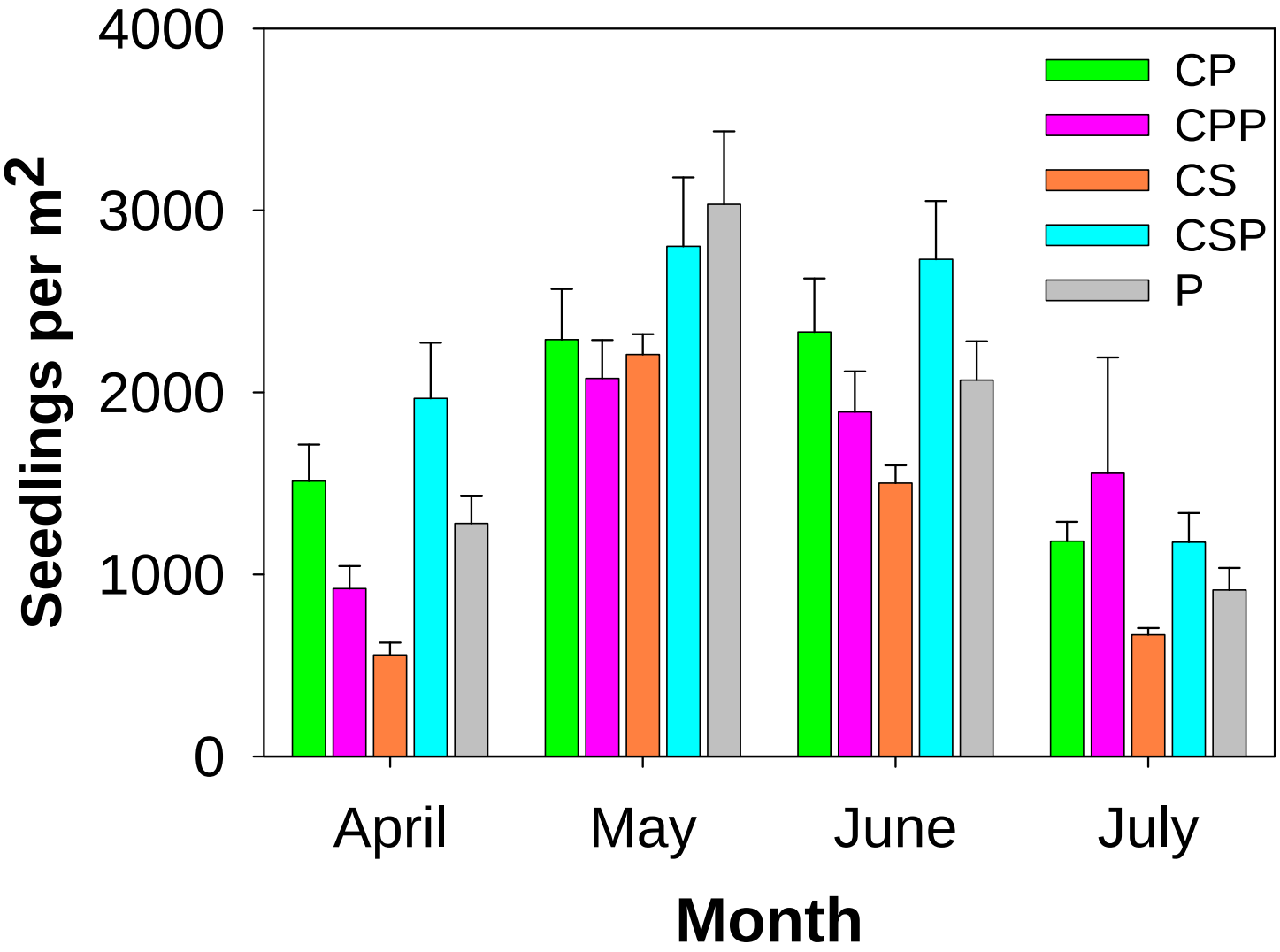
Initial Available P



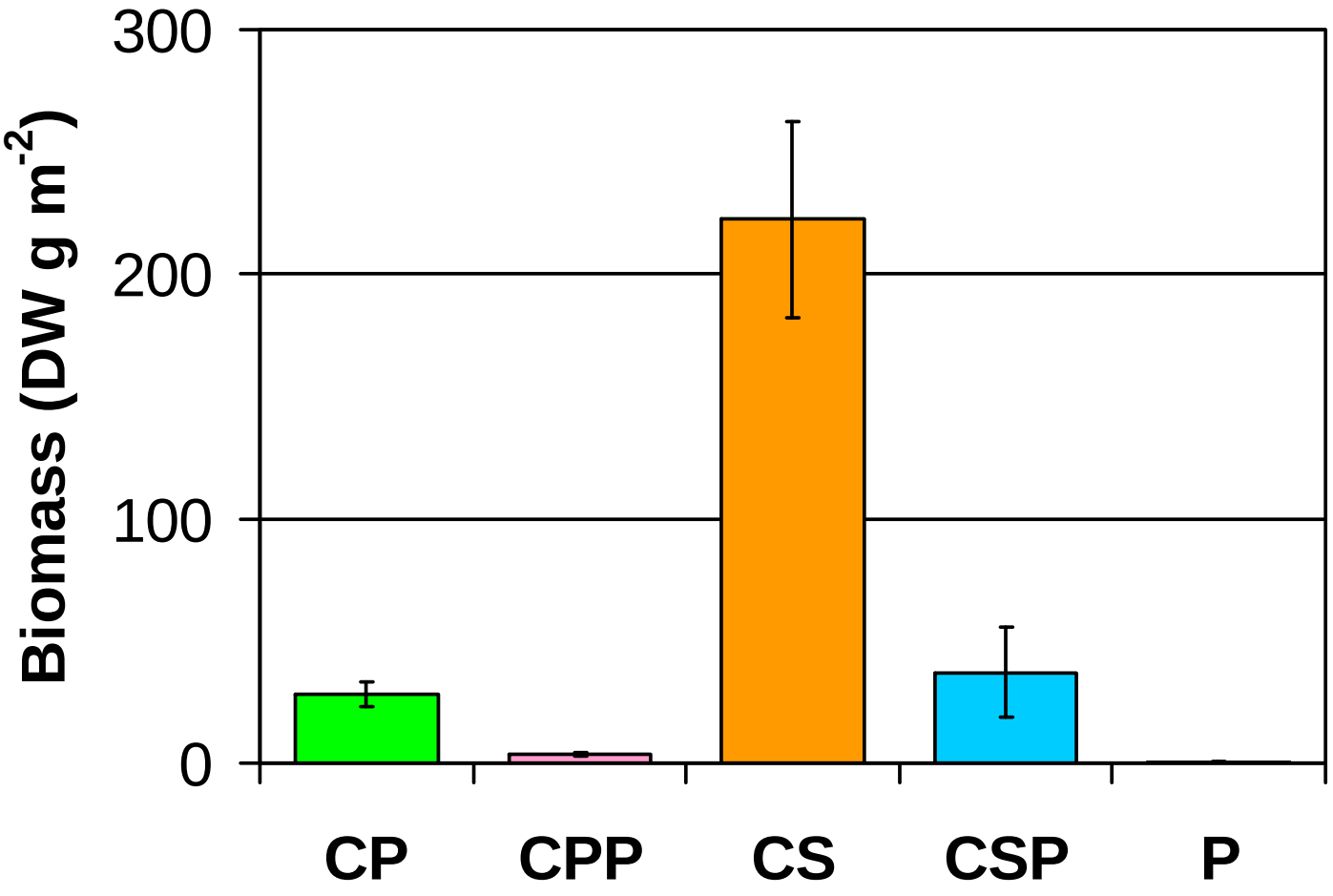
Effect of Sulphur



Germination



Plant Biomass August 2006



September - Heather Started to Germinate

Continuing Work

- Sampling compost for pH and available P 6 months later (now)

- Summer 2007 full sampling and analysis of compost material and vegetation biomass and species.