Ecological Surveys for
Sustainable Livestock Production

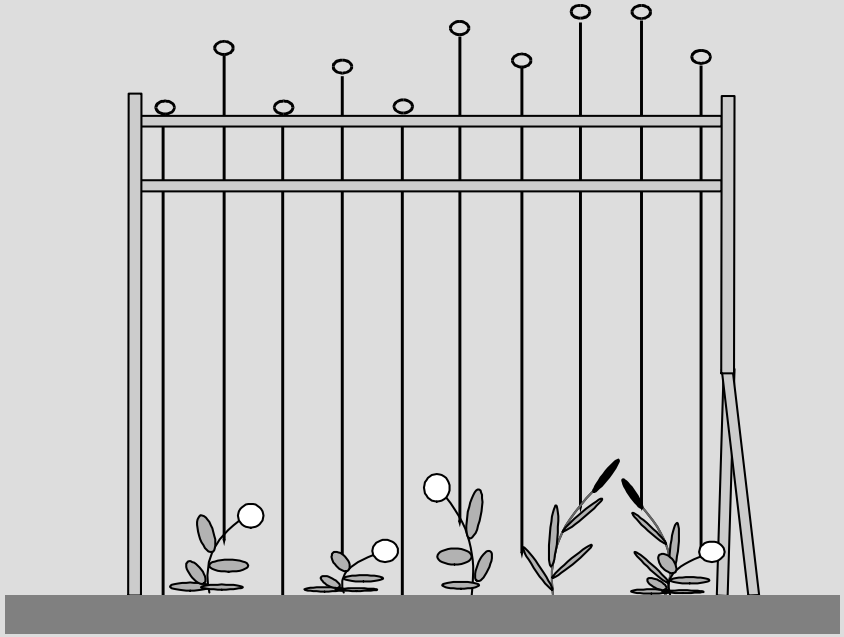
02 Methods: Field research

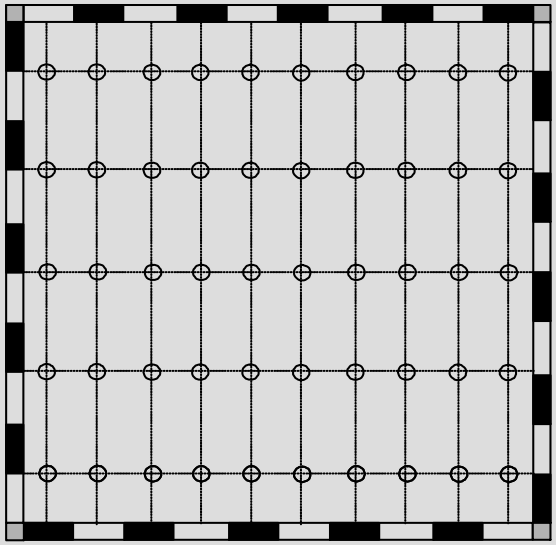
Field research methods

Methods of analysis:

- 10 point frame
- sampling square
- direct and indirect measures
- destructive and non-destructive sampling
- transects, plots, plotless measures
- vertical photo (different distances)
- remote sensing

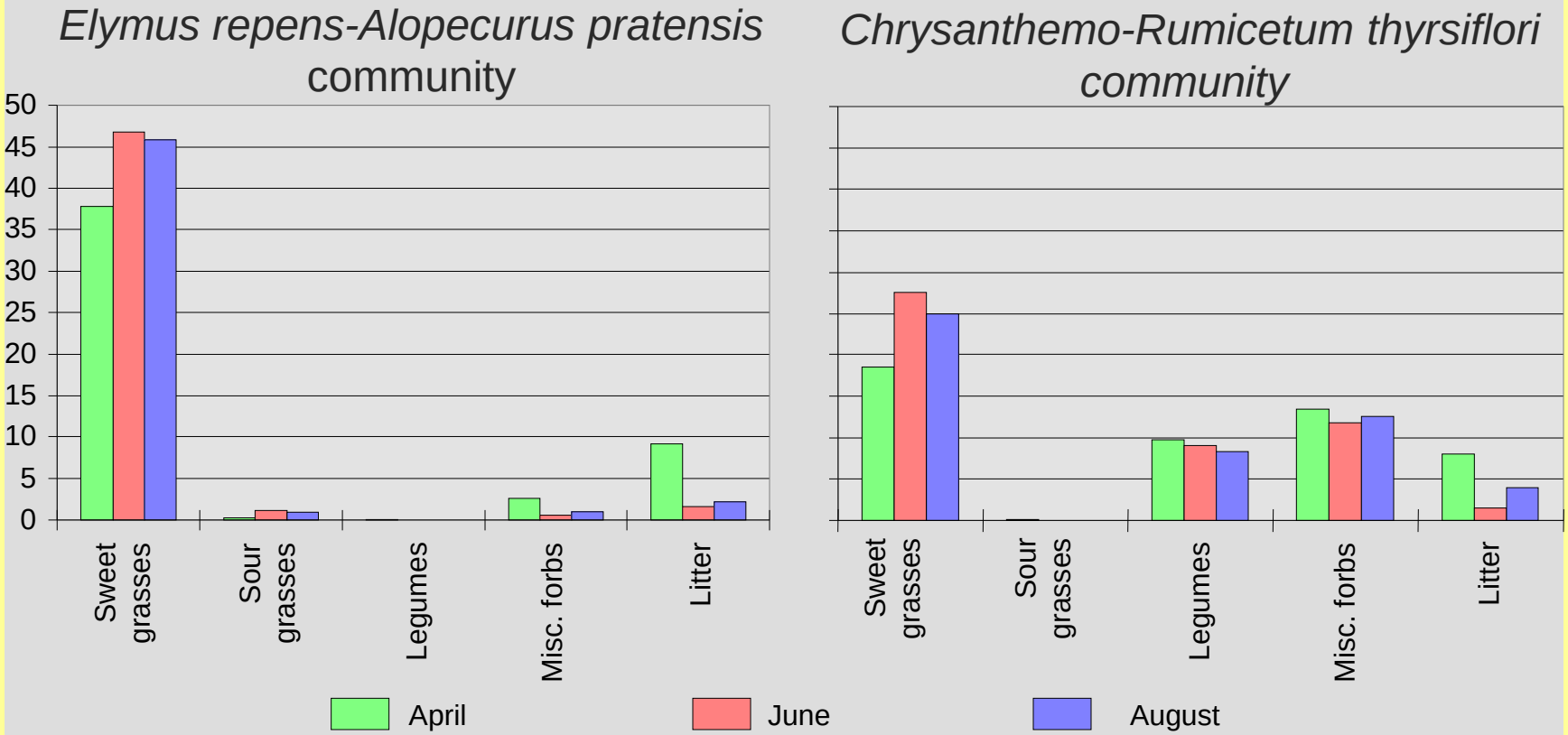
Lateral view of a ten-point frame and sampling pattern with 1 by 1 m ground frame





10 point frame and sampling square

Ten-point frame hits in two different wet-land communities at three dates during the vegetation period

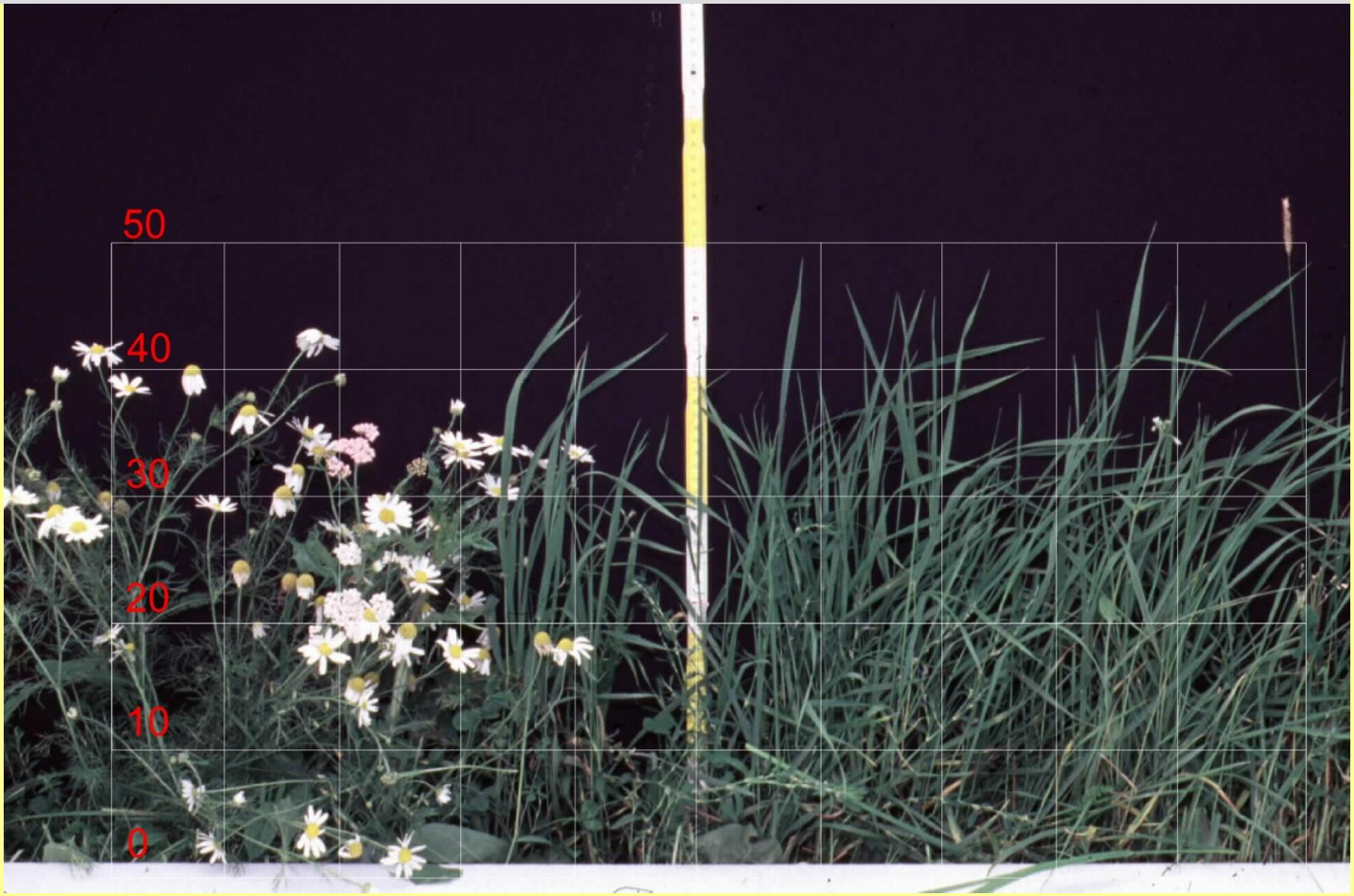


Scales for subjective estimates of plant species frequency and cover

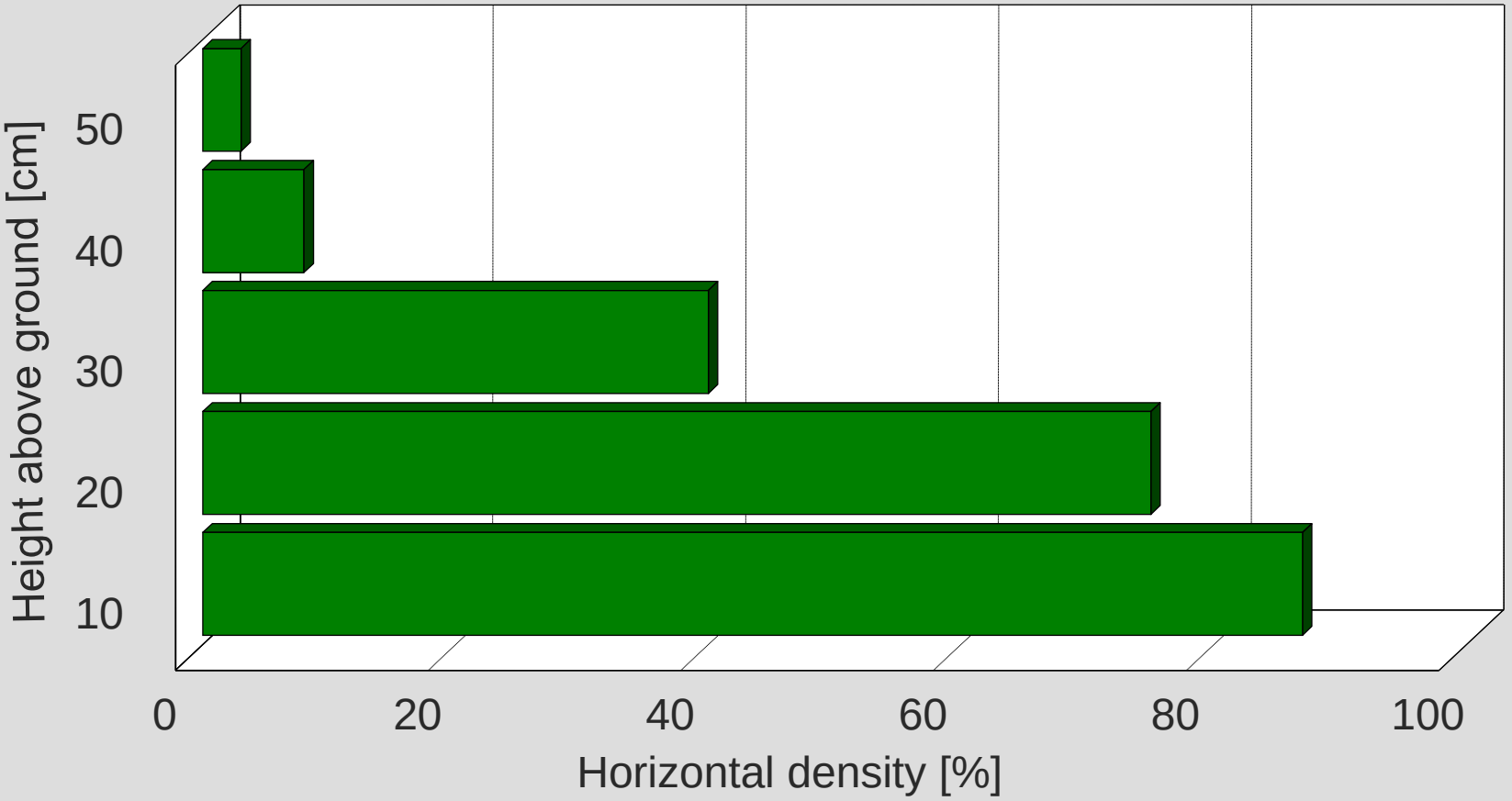
Frequency		Cover	
DAFOR	AVFOR	Braun-Planquet	Domin
(d) dominant	(a) abundant	(+) < 1 %	(+) 1 individuals
(a) abundant	(c) common	(1) 1 – 5 %	(1) 2 individuals
(f) frequent	(f) frequent	(2) 6 – 25 %	(2) > 1 %
(o) occasional	(o) occasional	(3) 26 – 50 %	(3) 1 – 4 %
(r) rare	(r) rare	(4) 51 – 75 %	(4) 4 – 10 %
		(5) 76 – 100 %	(5) 11 – 25 %
			(6) 26 – 33 %
			(7) 34 – 50 %
			(8) 51 – 75 %
			(9) 76 – 90 %
			(10) 91 – 100%

Sward height and sward density estimate along a transect

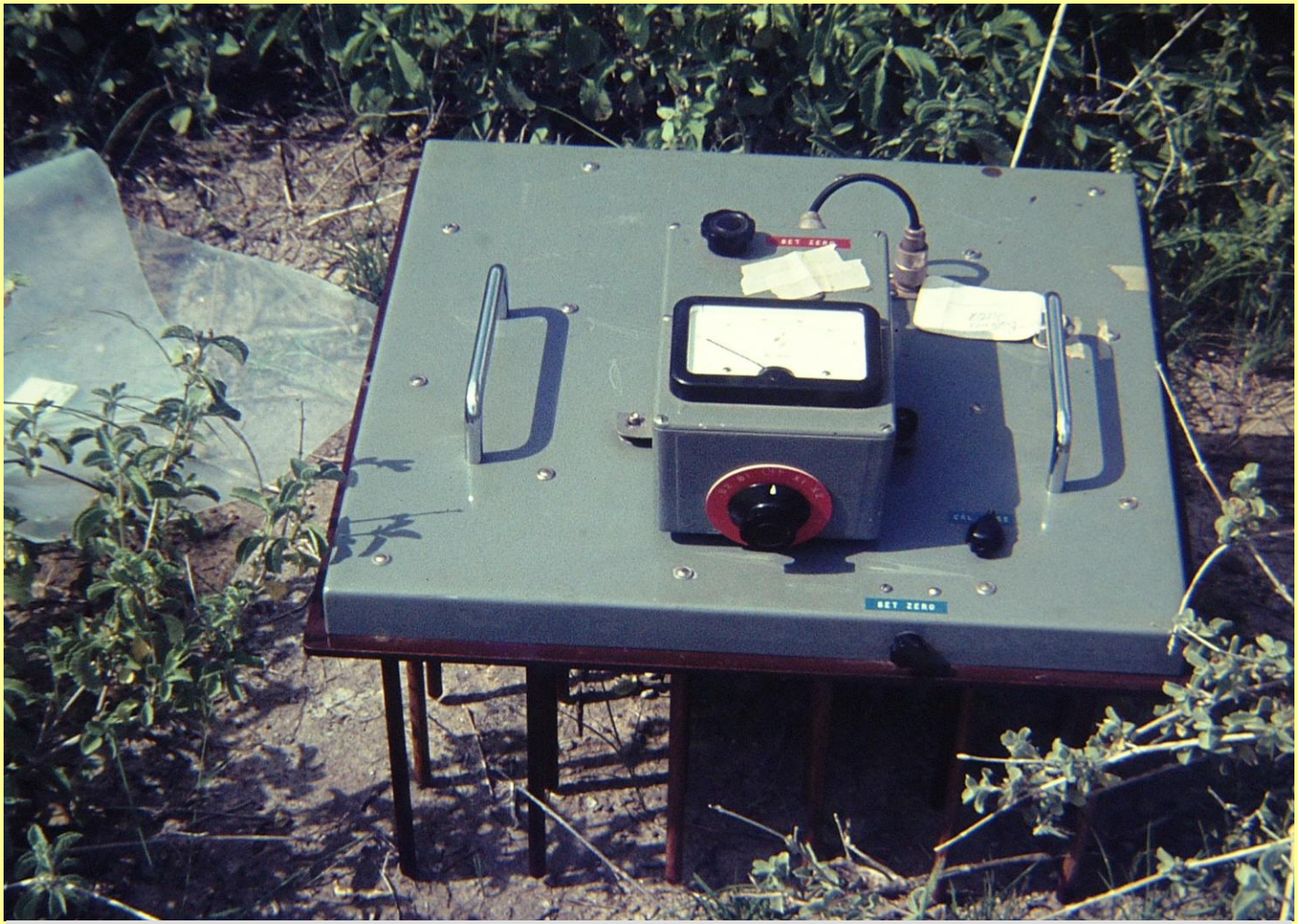
Lateral photograph of a standing herb layer strip (20 cm deep)



Horizontal density [%] of a 20 cm deep strip of herb layer in relation to height above ground [cm]



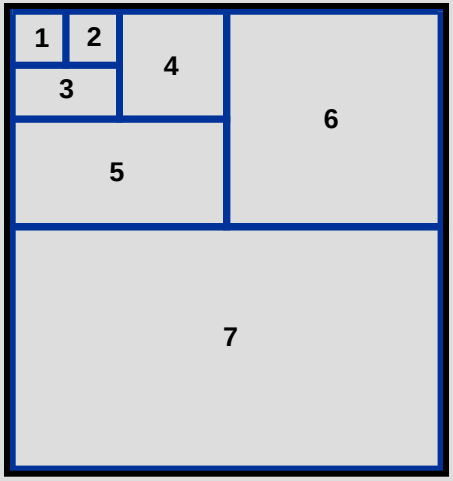
Reflectance measurement of green biomass

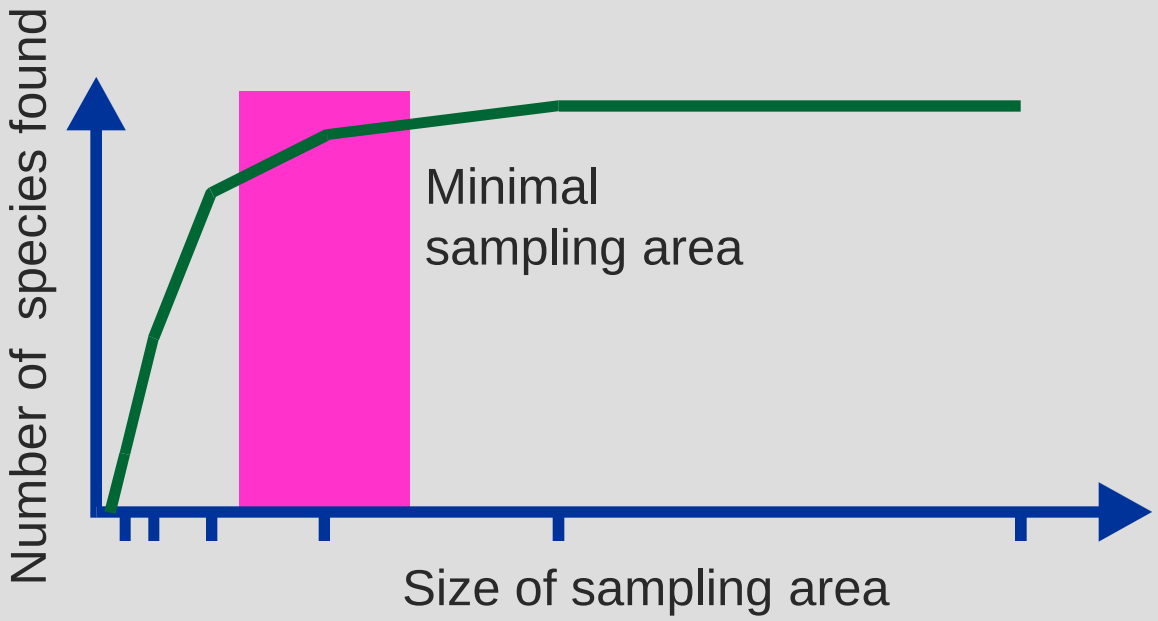


Capacity meter for green biomass volumes

Destructive sampling of various plant components

Progressive increase of sampling area and related increase of the number of recorded species



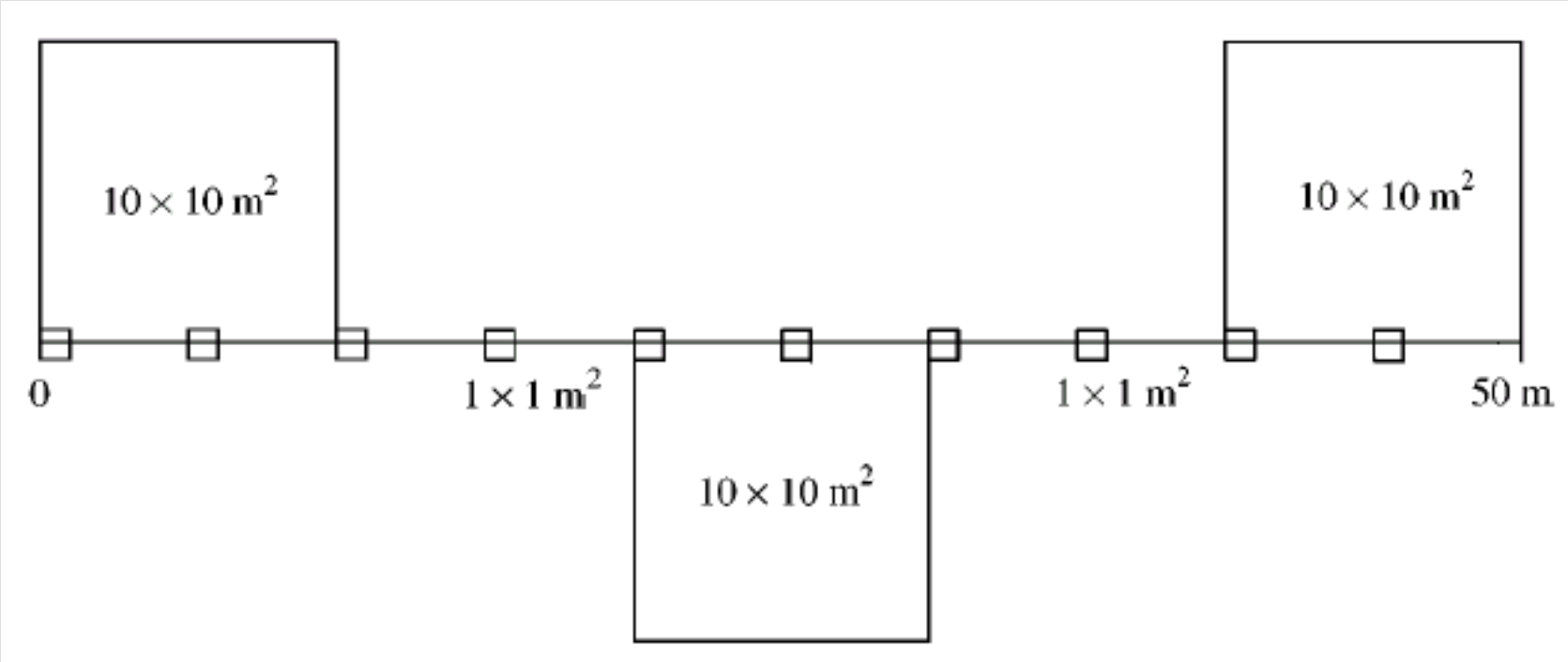


Source: Kent & Coker (1992)

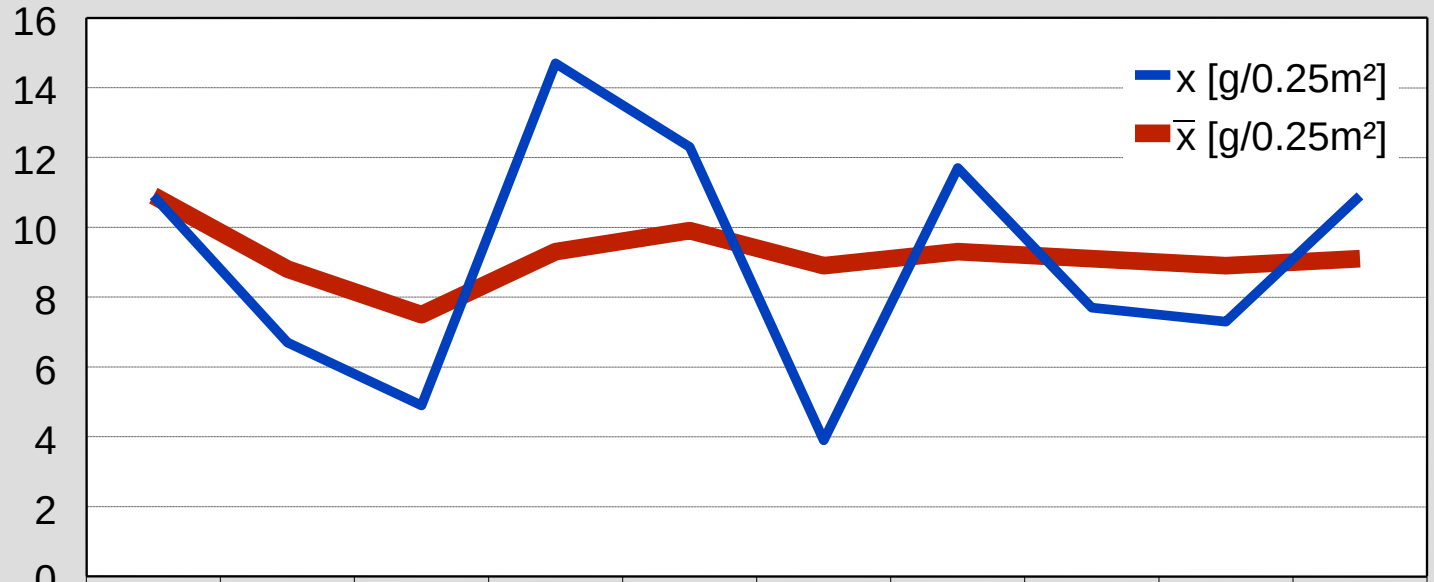
Recommended sample area size for different vegetation types

Vegetation type	Sample area size
Moss and lichens communities	0.5 x 0.5 m
Short grasslands, dwarf heath lands	1 x 1 m to 2 x 2 m
Dwarf shrub and high grasslands	2 x 2 m to 4 x 4
Bushlands, low woodlands	10 x 10 m
High woodlands, forests	Up to 50 x 50 m or without boundary

Layout of a sampling transect with smaller or larger sampling squares



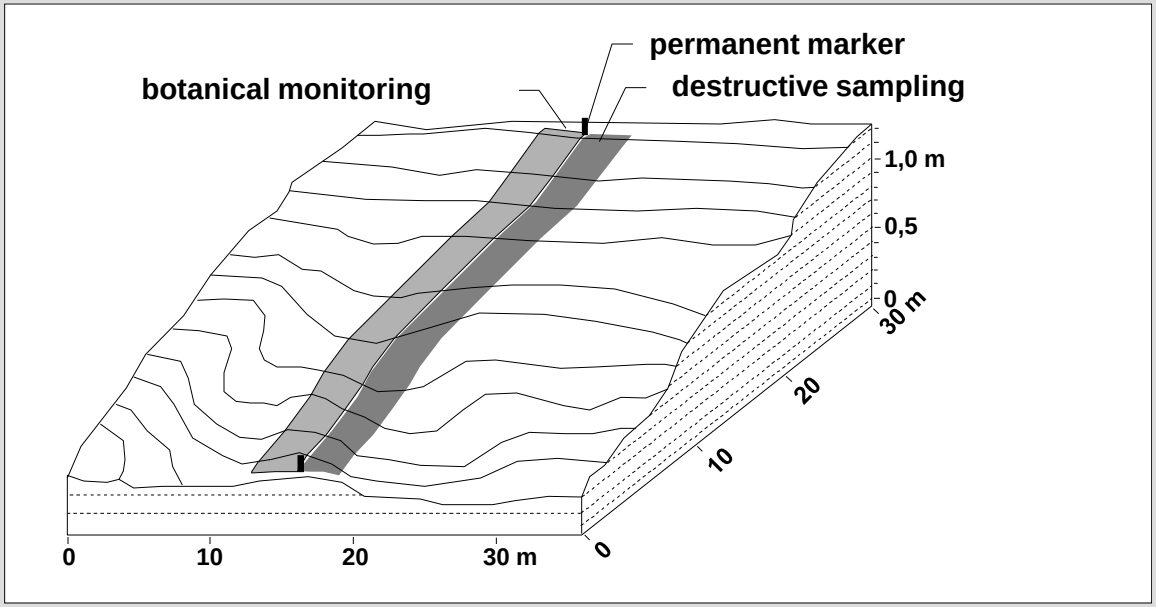
Biomass of single samples (x) and cumulative mean biomass ($\bar{x}$) of consecutive samples along a transect

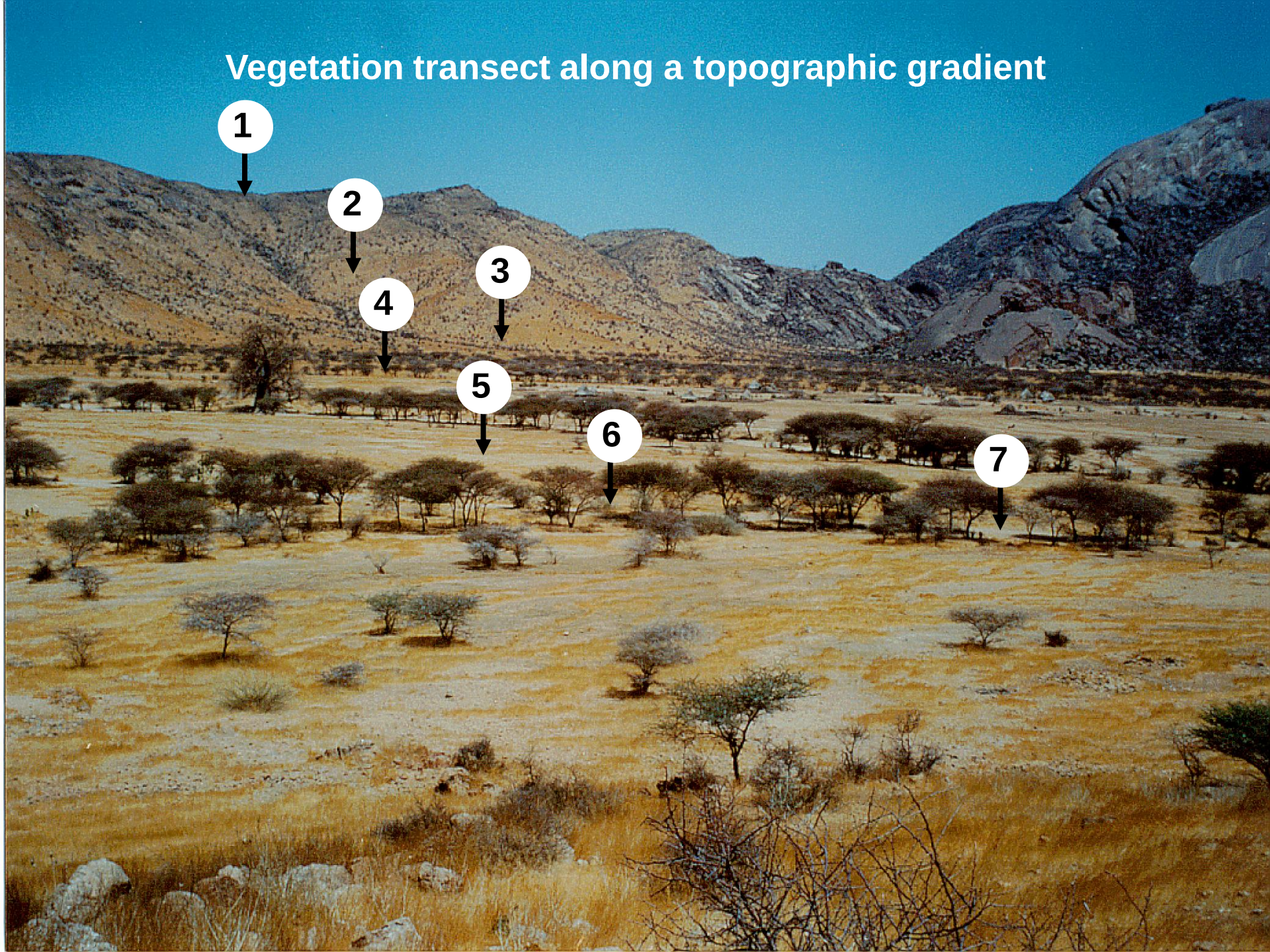


	1	2	3	4	5	6	7	8	9	10
x [g/0.25m²]	10,9	6,7	4,9	14,7	12,3	3,9	11,7	7,7	7,3	10,9
$\bar{x}$ [g/0.25m²]	10,9	8,8	7,5	9,3	9,9	8,9	9,3	9,1	8,9	9,1

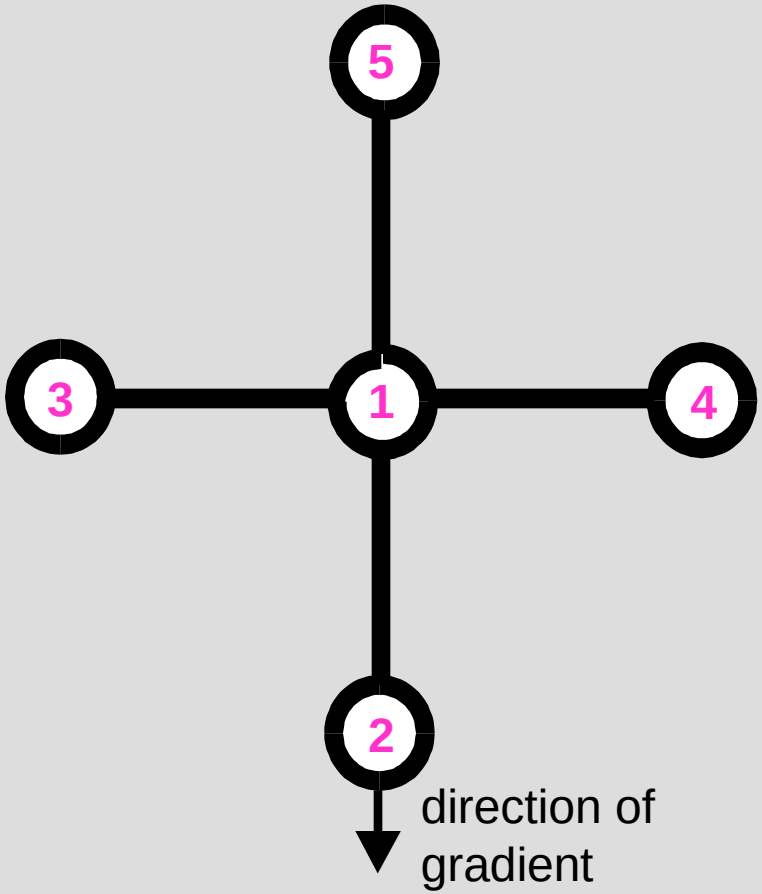
Layout of a permanent vegetation transect along a topographic gradient

Botanical monitoring and destructive sampling for biomass determination are carried out side by side in 2 by 2m plots along a permanently marked transect following the topographic gradient of the test site.

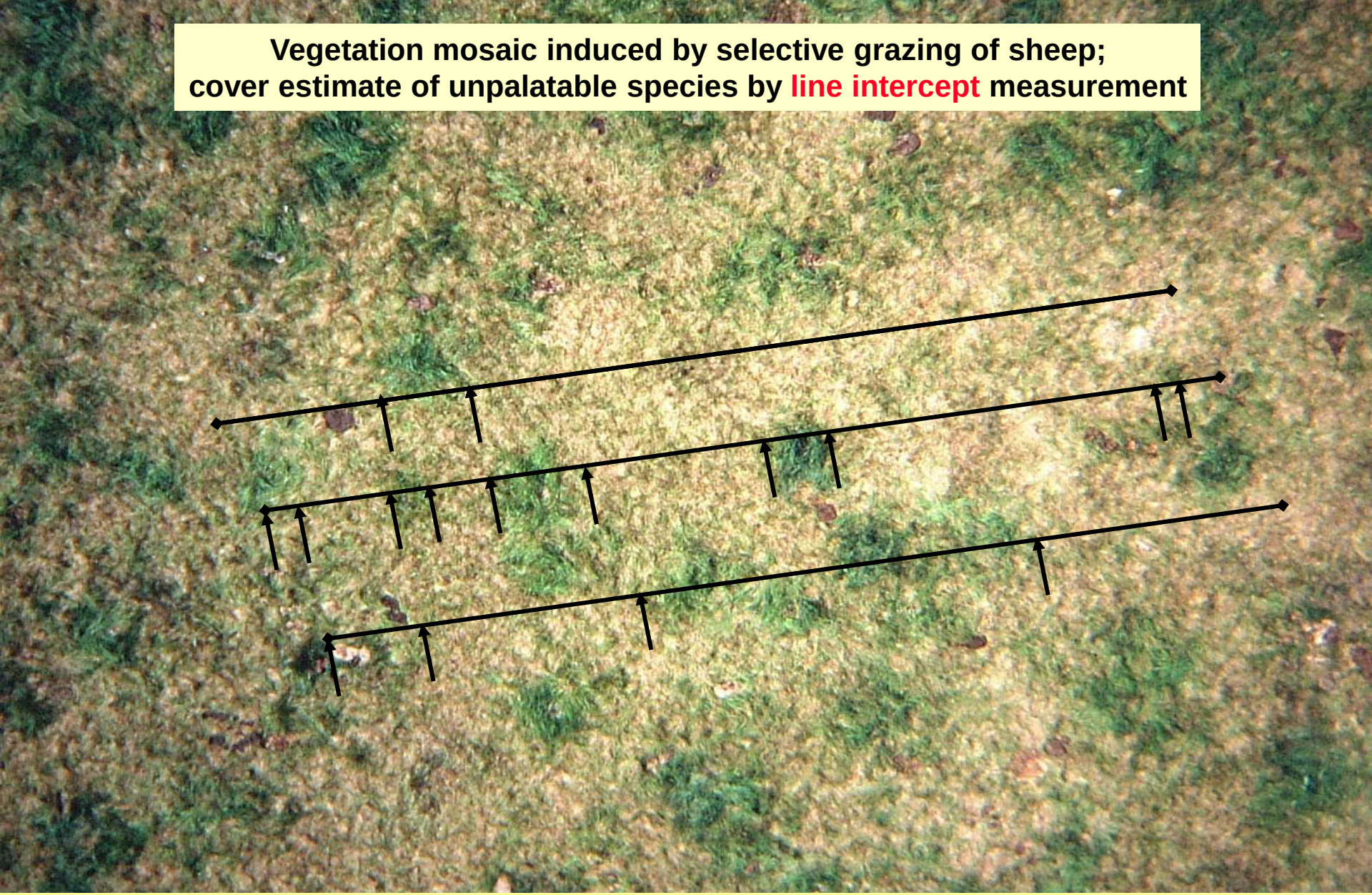



Vegetation transect along a topographic gradient
1
2
3
4
5
6
7

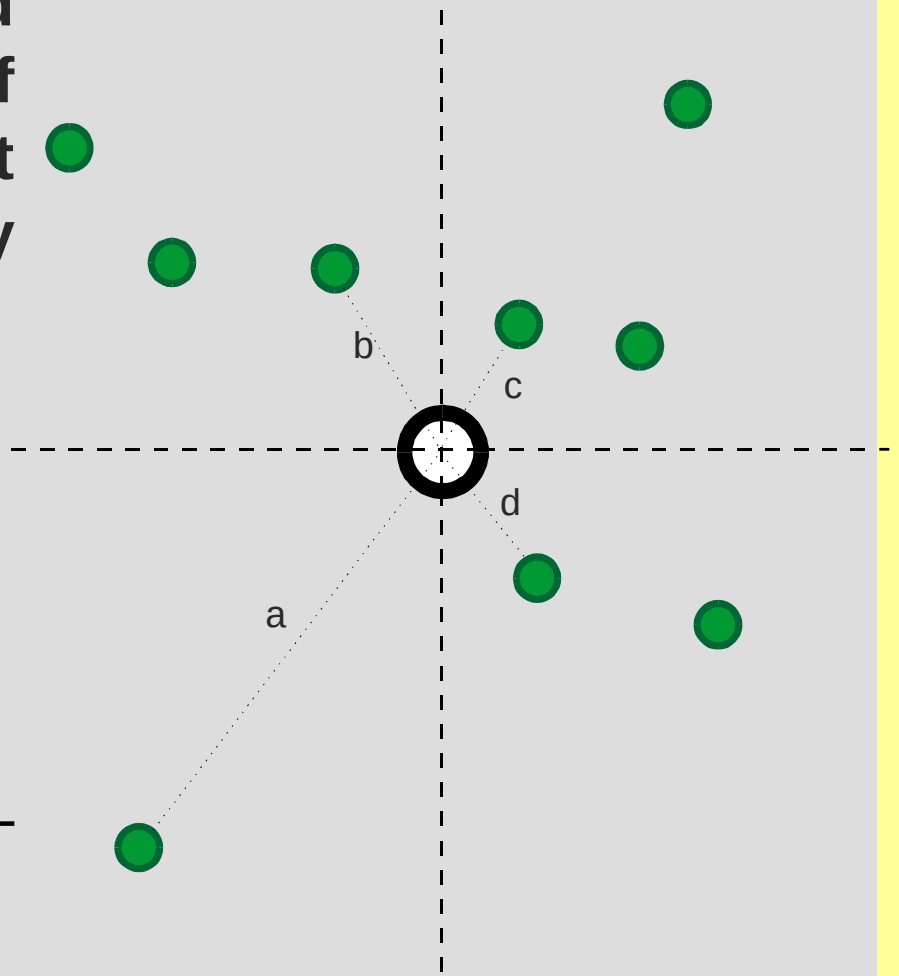
Layout of a data point cluster suitable for gradient analysis



Vegetation mosaic induced by selective grazing of sheep; cover estimate of unpalatable species by line intercept measurement

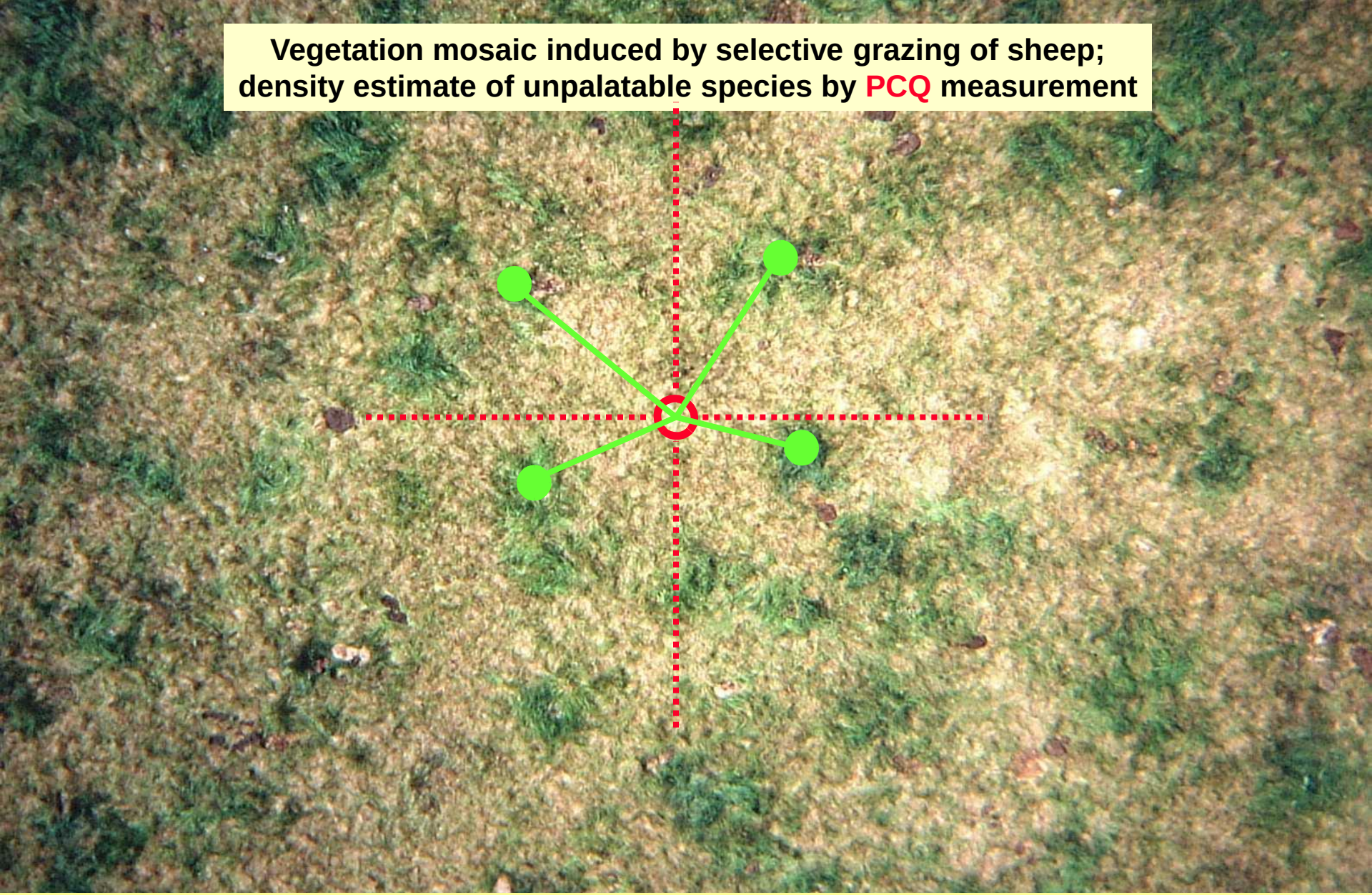


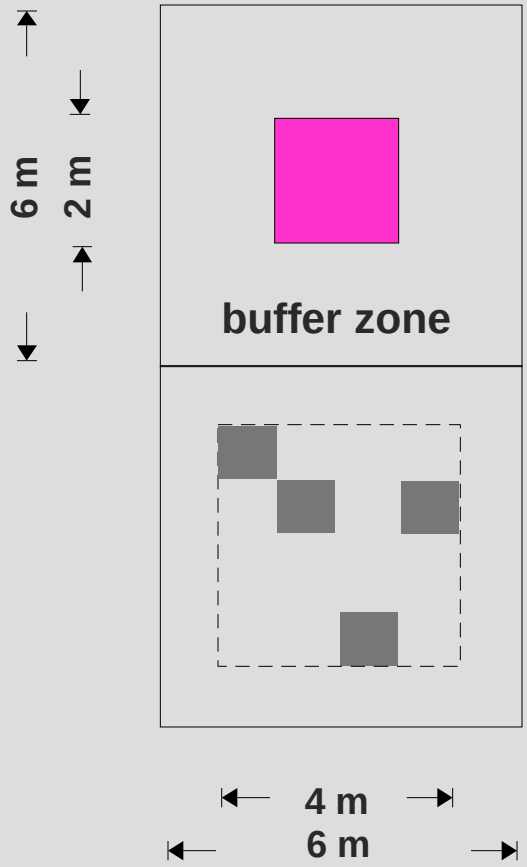
The Point Centered Quarter (PCQ) method of plot-less sampling of plant density



Density of a plant species = $\sqrt{\frac{\left(\frac{a+b+c+d}{4}\right)^2}{2}}$

Vegetation mosaic induced by selective grazing of sheep; density estimate of unpalatable species by PCQ measurement





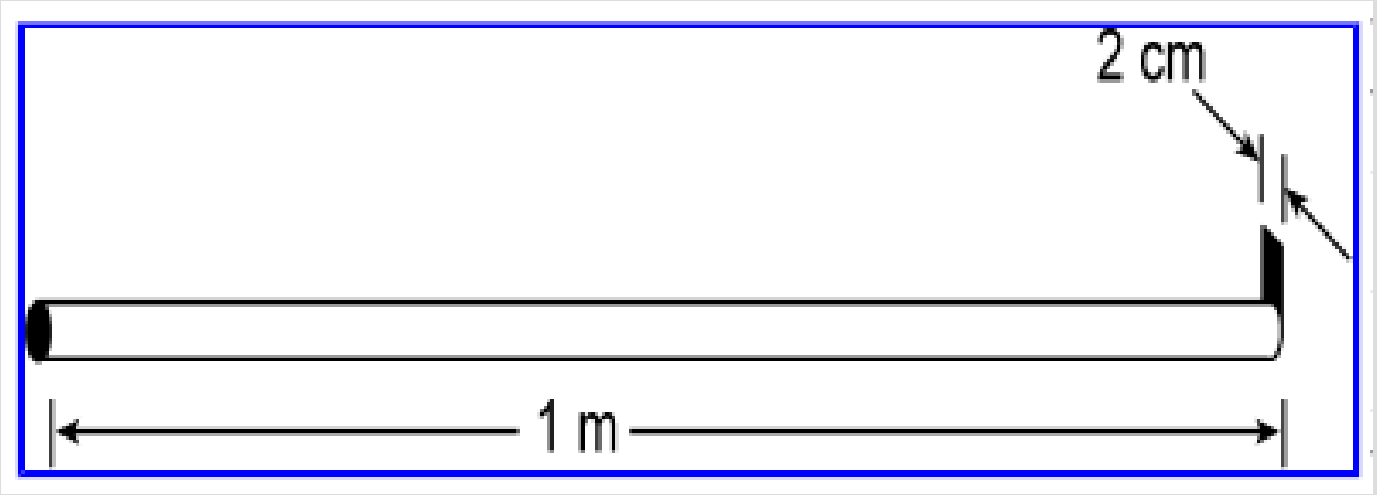
Legend

Sample plot for botanical monitoring

Sub-plots for destructive sampling

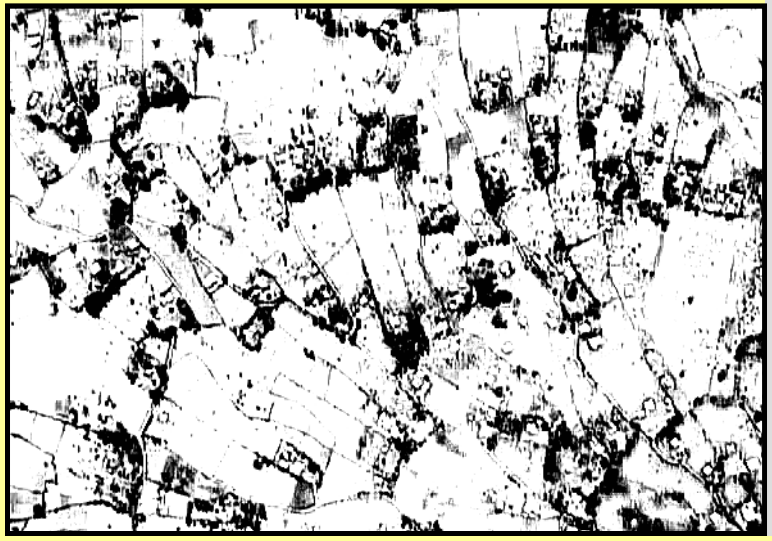
Layout for permanent sampling plots on grazed pastures

The Bitterlich-Stick



Bitterlich stick for estimating tree abundance. The stick is held to the eye and pointed horizontally with the crosspiece end to each tree surrounding the sample point. If the tree appears wider than the crosspiece it is counted otherwise it is excluded. If a Bitterlich stick with the above suggested configuration is used the number of trees counted from the sample point is a direct estimate of abundance as basal area per hectare (m2 * ha-1).

Source: Pollen Monitoring Programme; http://wdc.obs-mip.fr/pmp/vegmapping.html



~1 m resolution true color aerial photograph of a hypothetical 64 ha Focal Area located in a portion of the Yala River Basin with provisional identification of house hold locations (red dots); below image processed to highlight the distribution of woody vegetation cover in the image.

Ground sampling design at the focal area and plot levels of observation