



ICOS ancillary data workshop

Gembloux, September 2015



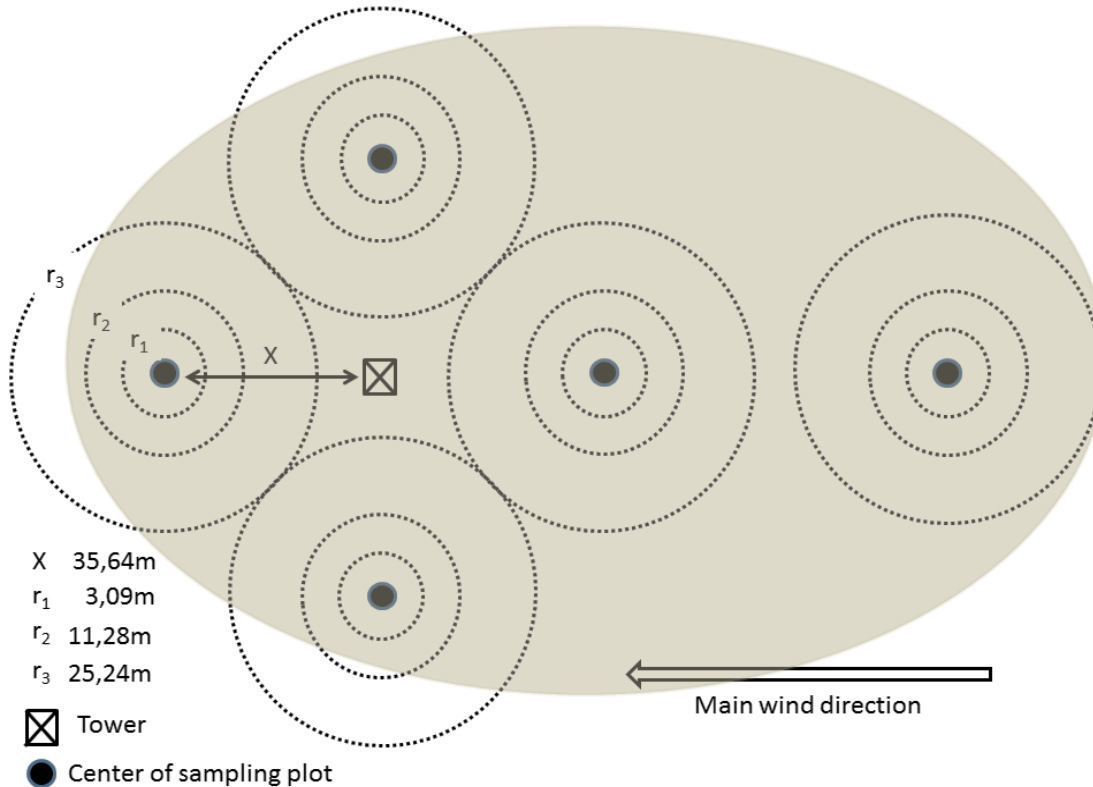
A photograph of a forest with many tall, thin trees and a ground covered in fallen leaves. The trees are mostly deciduous and have thin trunks. The ground is covered in a thick layer of brown and yellow leaves. The lighting is bright, suggesting a sunny day. The text "Forest ancillary data" is overlaid in the center of the image.

Forest ancillary data

3 variables to measure

- Green area index (GAI)
- Above ground biomass (AGB)
- Litter fall

Spatial sampling design



Within each plot:

- Ancillary data
 - Biomass (annual)
 - LAI (seasonal)
 - Litter fall (seasonal)
- Soil climate
 - Soil temperature
 - Soil moisture
 - Water table

Should be place within the footprint and vegetation within plot should be representative for the footprint

CLASS 1 = Min 4 plots

CLASS 2 = Min 2 plots

Who has already installed plots?

GAI

- GAI: Green Area Index
- definition: *the photosynthetically active surface area of standing vegetation, expressed per unit of ground area. (For Forests GAI = LAI)*
- Units: $\text{m}^2 \text{m}^{-2}$

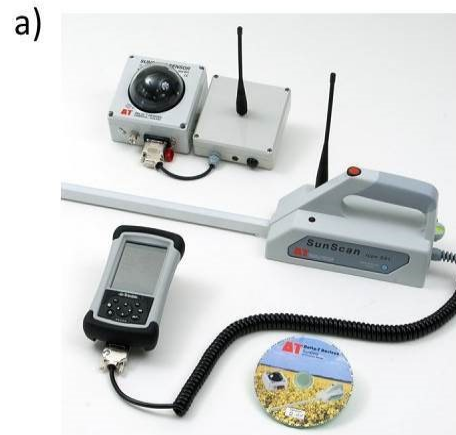
GAI - Methodology

GAI < 6

GAI > 6



Digital hemispherical pictures (DHP)



SS1 Sunscan Canopy Analyzer

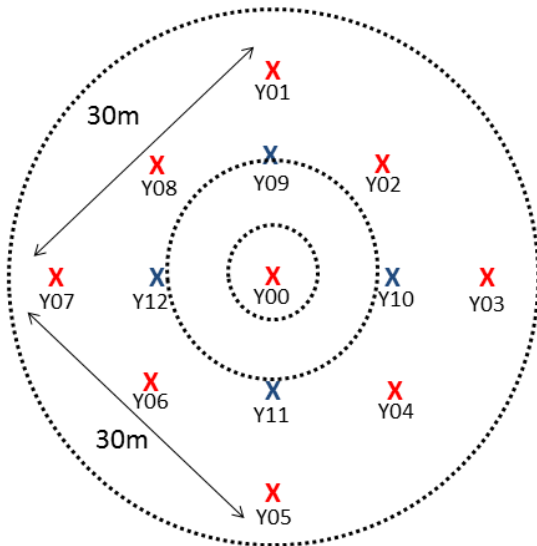


AccuPAR LP-80

Linear ceptometer

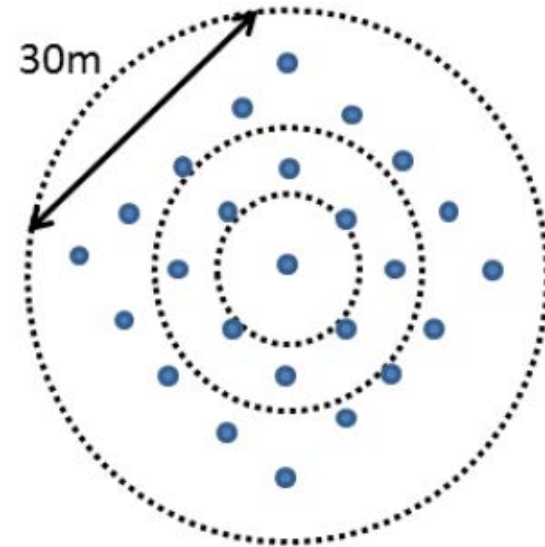
GAI – spatial sampling design

- DHP



Systematic grid of 15m

- ceptometer

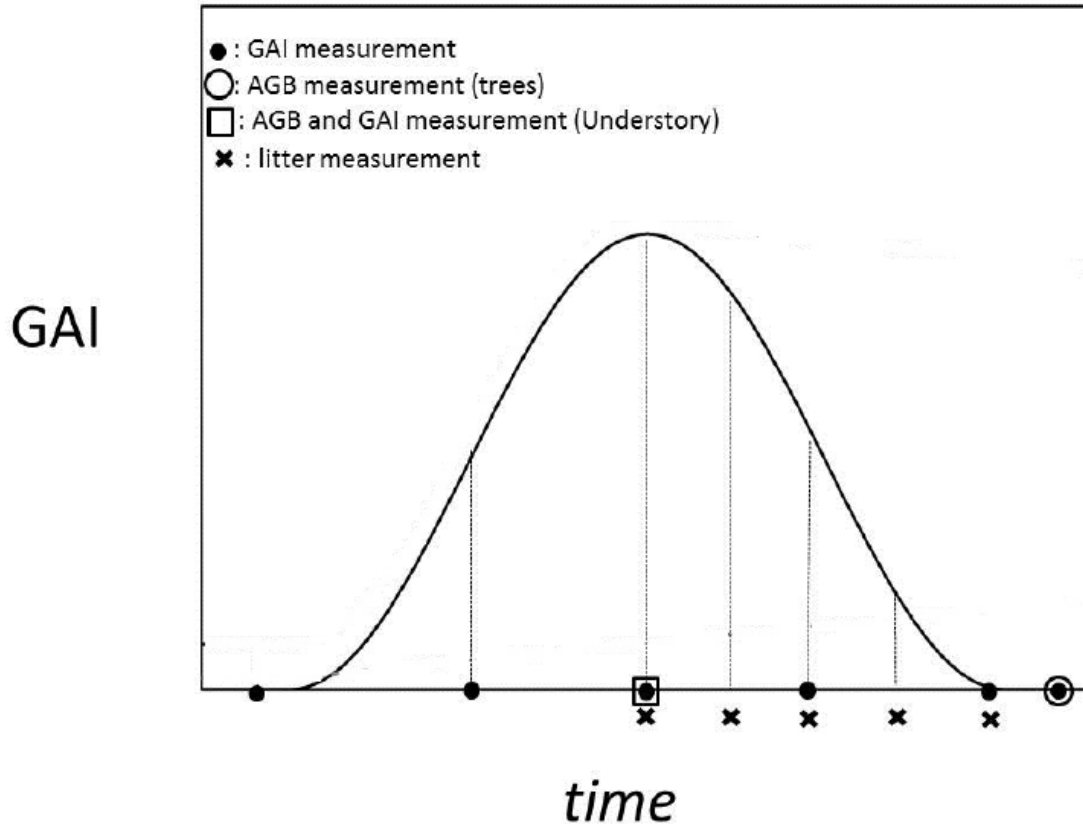


Systematic grid of 7.5 m

- X Location of overstorey GAI measurements by DHP
- X Additional location of overstorey GAI measurements by DHP

All locations should be marked and mapped!!

GAI – temporal sampling design



- Class 1 = Class 2
- 6 GAI measurements for overstorey
- Timing is in collaboration with PI

GAI – Hemitool for DHP

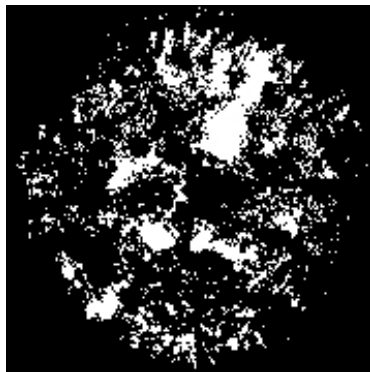
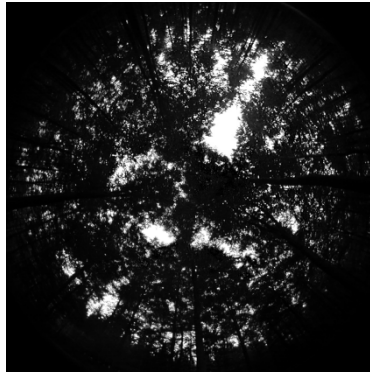
- Antwerp March 2015
- Expert meeting to
 - build automatic processing tool
 - Write field measurement protocol



test version available at
<https://icos.ua.ac.be/>

**Test Phase during growing
season 2015**

GAI – Hemitool for DHP



Digital RGB image



Extraction blue channel



Thresholding



Determination gap fraction



LAI^{eff}

GAI - Hemitool

Upload LAI pictures

Site:

Person:

Slope (0° - 90°):

Slope Aspect (0° - 360°):

Camera Setup:

Camera type:

Camera Serial number:

Lens Type:

Lens Serial Number:

Lens Center Rowpixel:

Lens Center Columnpixel:

Lens Type Projectionfunction A Parameter:

Lens Type Projectionfunction B Parameter:

[+ Add files...](#) [Start upload](#) [Cancel upload](#)

[test version available at https://icos.ua.ac.be/](https://icos.ua.ac.be/)

Presentation by Emmy Jacobs on Wednesday

GAI - Ceptometer

- See presentation of grasslands → Maarten

Created by SunData for Windows Mobile v2.0.0.2

Title : GAI_20150707

Location : BE_Dor

Latitude : 51.15N Longitude : 4.42E

7/07/2015 Local time is GMT+2 Hrs

SunScan probe v1.02R (C) JGW 2004/01/19

Ext Sensor: BFS Leaf Angle Distn Parameter: 1 Leaf Absorption: 0.85

Group 1:

Time	Plot	crop	Trans- mitted	Spread	Incid- ent	Beam frac	Zenith Angle	LAI	Notes
10:07:53	1	1	120.4	0.16	474.4	0.14		50.7	1.9
10:08:13	1	2	133.9	0.12	463.4	0.14		50.7	1.7
10:08:38	1	3	100.1	0.19	438.4	0.12		50.6	2.1
10:09:04	2	1	114.7	0.18	436.6	0.13		50.5	1.9
10:09:32	2	2	101.2	0.19	542.1	0.31		50.5	2.4
10:09:54	2	3	106.5	0.09	420.1	0.11		50.4	1.9
10:10:33	3	1	82.1	0.21	444.5	0.16		50.3	2.4
10:11:08	3	2	164.5	0.19	477.4	0.21		50.2	1.5
10:11:28	3	3	142.4	0.27	477.4	0.21		50.2	1.7
10:12:08	4	1	173.2	0.17	714.3	0.46		50.1	2

AGB

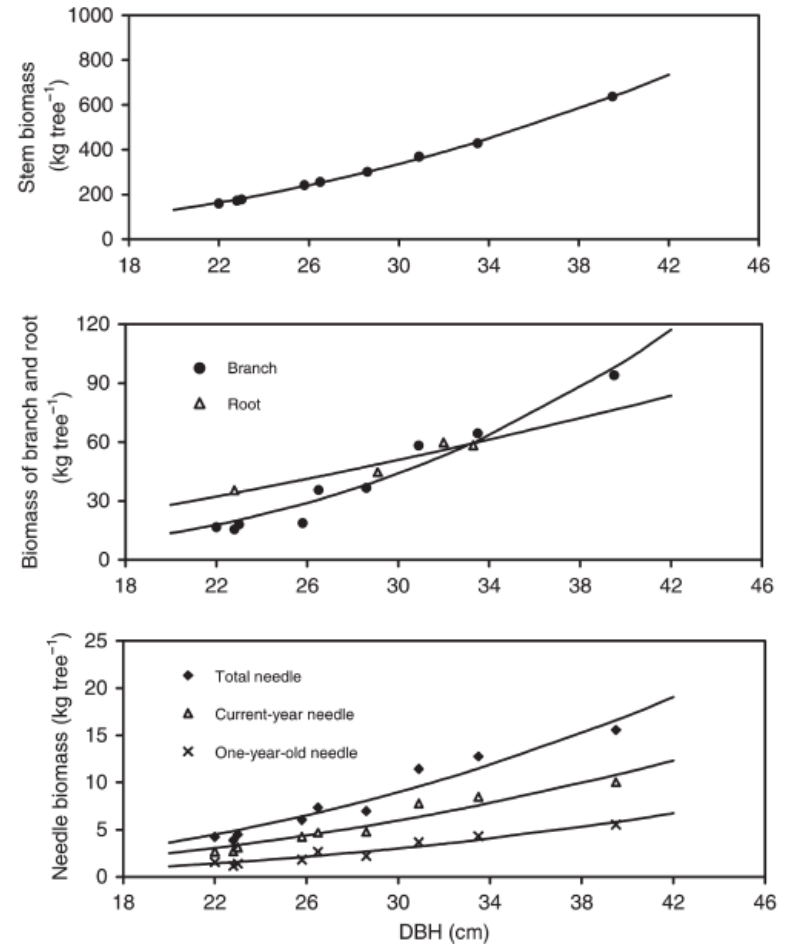
- AGB: Above ground Biomass
- definition: the dry matter (DM) of the Aboveground fraction of standing vegetation, expressed per unit of ground area
- Units: g DW m⁻²



AGB - methodology

- Allometry: relation between diameter at breast height (DBH) and AGB components:
 - Stem biomass
 - Branch biomass
 - Leaf biomass (at peak)

$$Y = ax^b$$



AGB - methodology

- Class 1: *preferably* site specific, *preferably* recently measured for all species present that represent 80% of Basal Area.
- Class 2: literature values
- Criteria for literature values (to discuss):
 - 1) Mean annual temperature within 2°C of the research site
 - 2) Mean annual precipitation within 200mm of the research site
 - 3) Similar soil type
 - 4) Age class within 30 year range of the mean stand age at research site

AGB - methodology

- Dendrometers:
 - mandatory for class 1
 - 6 dominant trees within the plots
 - Eg D6 by UMS.



AGB – spatial sampling

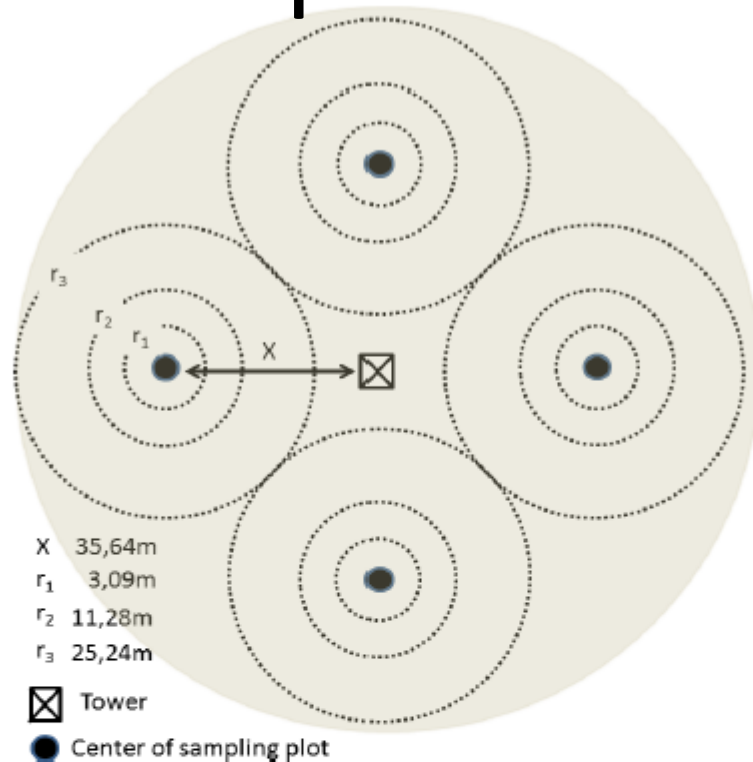
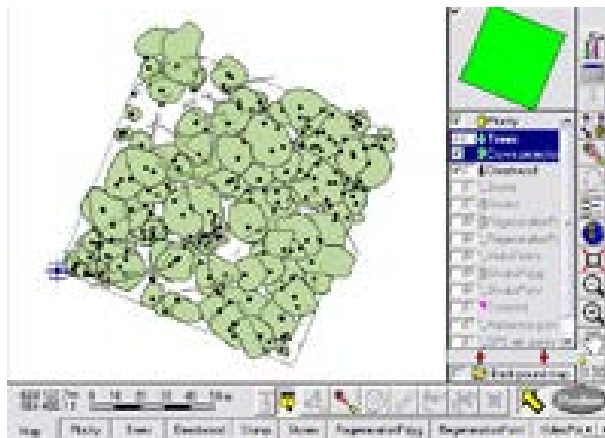


Fig 5: The nested sampling design for tree inventory measurements

class	tree size	Subplot size	
		radius	area (m ²)
1	DBH ≥ 50 cm	25.24	2000
2	DBH ≥ 10 cm	11.28	400
3	DBH ≥ 5 cm * (only trees higher than 130 cm)	3.09	30

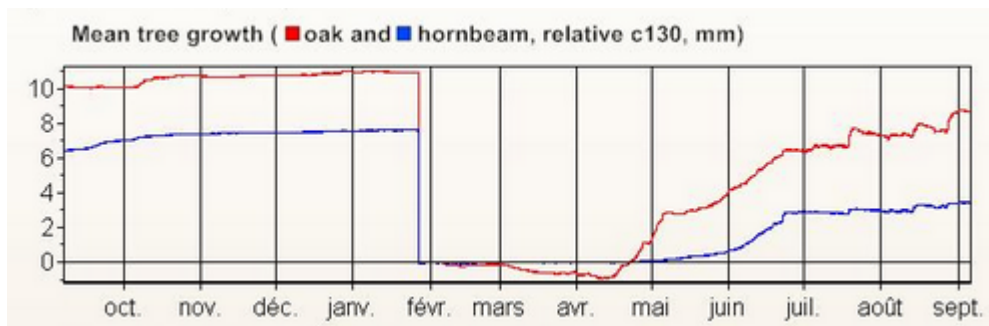
AGB – spatial sampling

- We require that all trees and equipment within the plots are mapped. (Class 1 and 2)
- Fieldmap instrument will be demonstrated tomorrow + we will circulate one (or two) between ICOS sites.



AGB – temporal sampling design

- DBH:
 - every three years (class 1 and class 2)
 - After harvest or natural disturbance
- Dendrometer:
 - continuous



Litter fall

- Definition: the dry mass of litter, expressed per unit of ground area
- Units: g DW m⁻²
- Very useful to validate GAI_{max} in deciduous forests

Litter fall - methodology

- Litter traps
- Criteria:
 - Circular or square
 - No fixed size, minimum 0.5m²
 - Horizontally placed
 - 1m above forest floor
 - Mesh size <0.5mm and light color (not black)
 - Nylon
 - Allow drainage

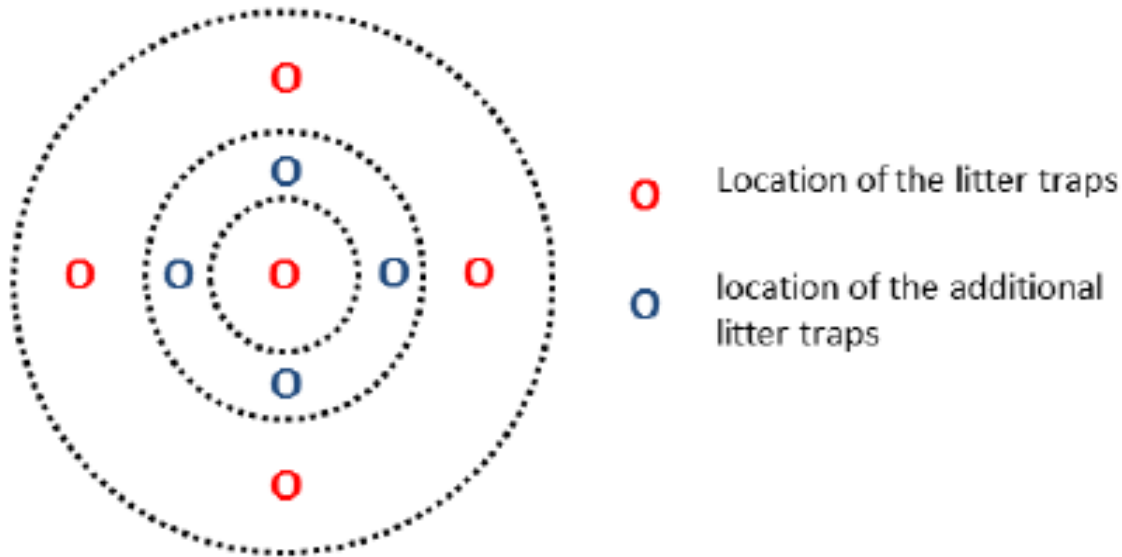


Litter fall - methodology

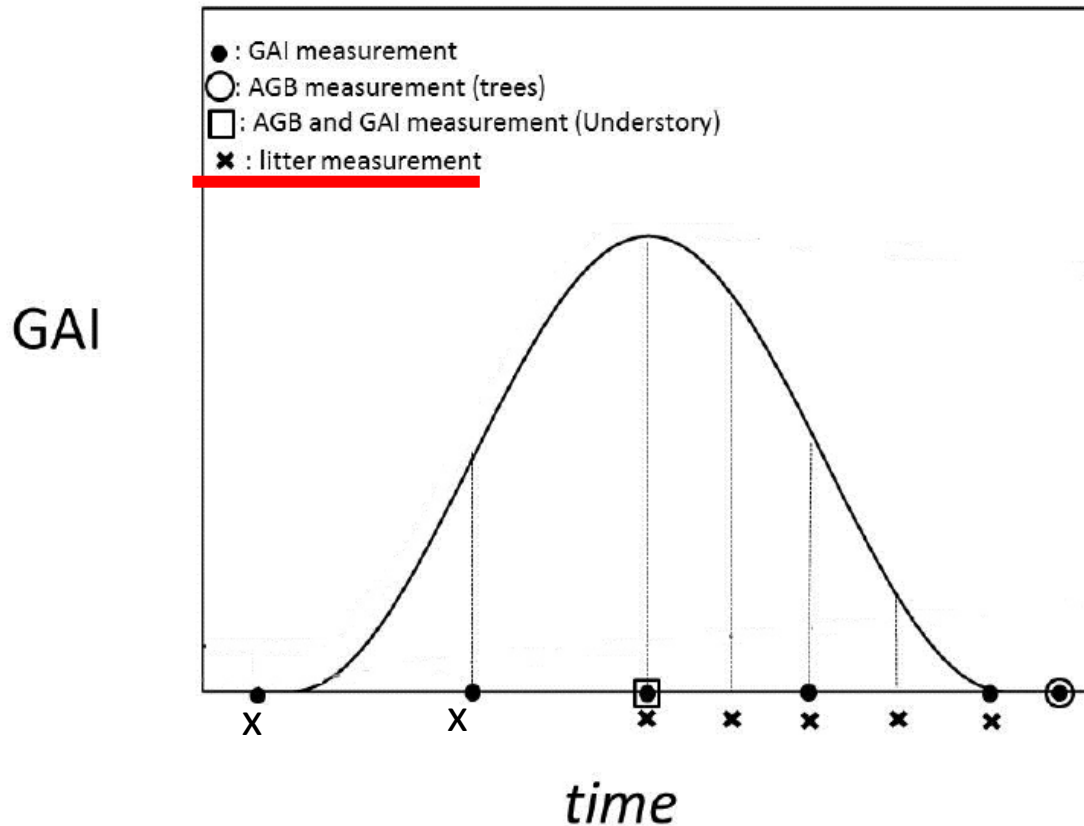
- Collect the different fractions
 - Leafs and needles (separated for mixed forests)
 - Fruits
 - Small woody fraction (up to 2cm in diameter)
- Dry and send DM per trap (see presentation Friday)

Litter fall – spatial sampling

- At least 5 traps per plot
- Cross design with $\pm 10\text{m}$ between points
- Add 4 in case of high variability



Litter fall – Temporal sampling



- Only class 1 (but **highly** recommended for class 2)
- Monthly outside main litter fall period (PI)
- Biweekly period of main litter fall