

# **Nitrogen in a fir stand. Is there any risk of saturation?**

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## Warnings of the risks of N saturation in forests

| Macdonald et al. (2002)            | Cole et al. (1992)  | Dise and Wright (1995)              | Aber et al. (1998)                              | Gudersén et al. (2006)                                |
|------------------------------------|---|-------------------------------------|---|---|
| C/N < 25<br>In organic soil layers | Loads of N > 5000 kg/ha in soil and C/N < 20 in organic soil layers | Fluxes of throughfall > 10 kg/ha/yr | Changes in N concentrations in leaves over time | Concentrations of nitrate N in soil solution > 1 mg/L |

## Characteristics of the experimental plot

Location: Karpenisi mountainous area, central Greece

Altitude: 1170 m

Area: 0.27 ha

Annual rain height: 1530 mm

Soil type: Humic Alisol

Vegetation: fir (*Abies borisii regis*), shrubs (*Rubus hirtus*), ferns (*Pteridium aquilinum*), herbs (*Brahypodium sylvaticum*, *Gernanium lucidum*)

## **Loads of N and C/N in the soil layers of the plot**

| Soil layer | C/N | N (kg/ha) |
|------------|-----|-----------|
| L          | 42  | 121       |
| FH         | 19  | 970       |
| 0-10 cm    | 15  | 2053      |
| 10-20 cm   | 14  | 2082      |
| 20-40 cm   | 13  | 3428      |
| 40-80 cm   | 11  | 2210      |

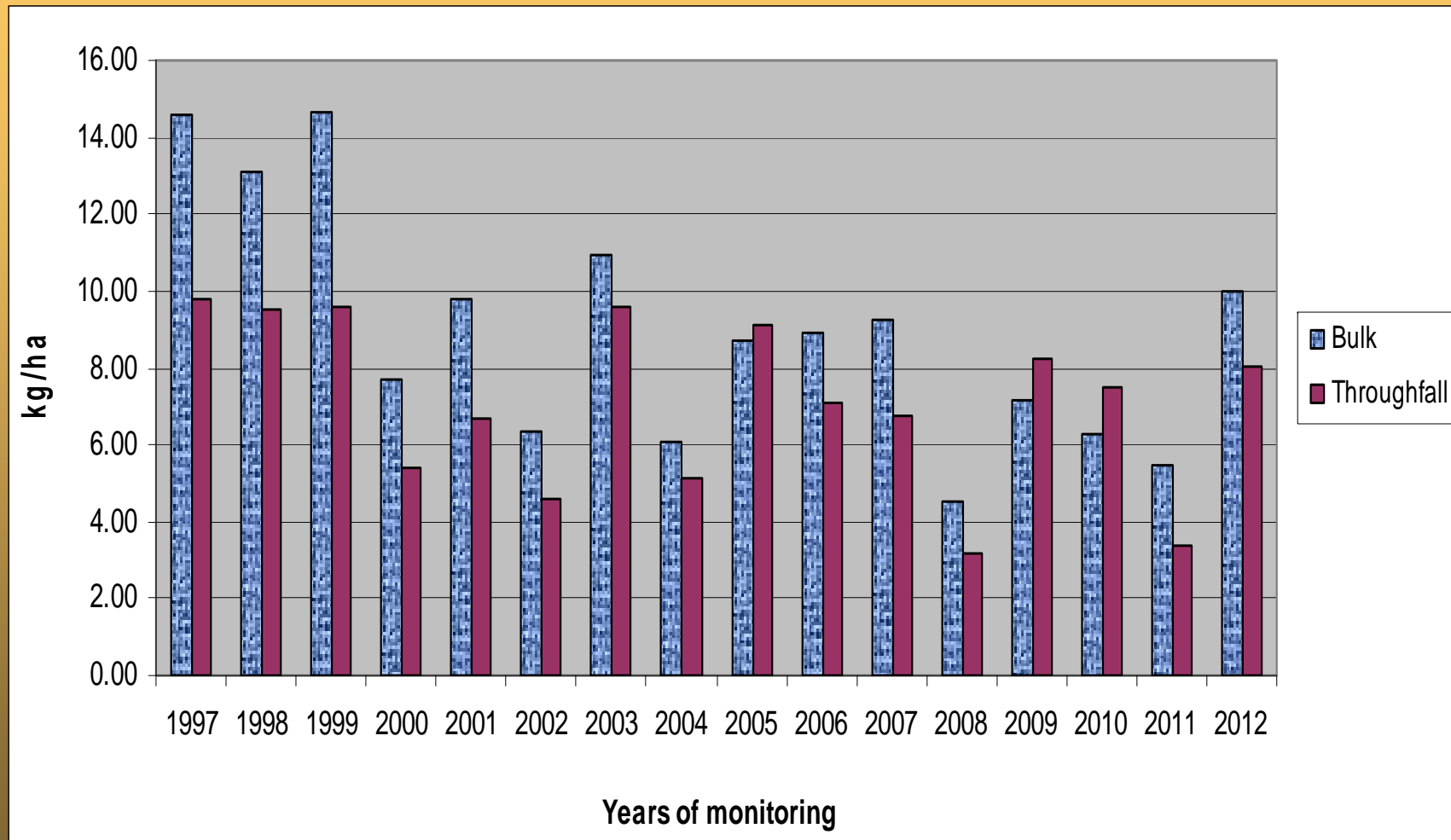
**Total= 10,864**



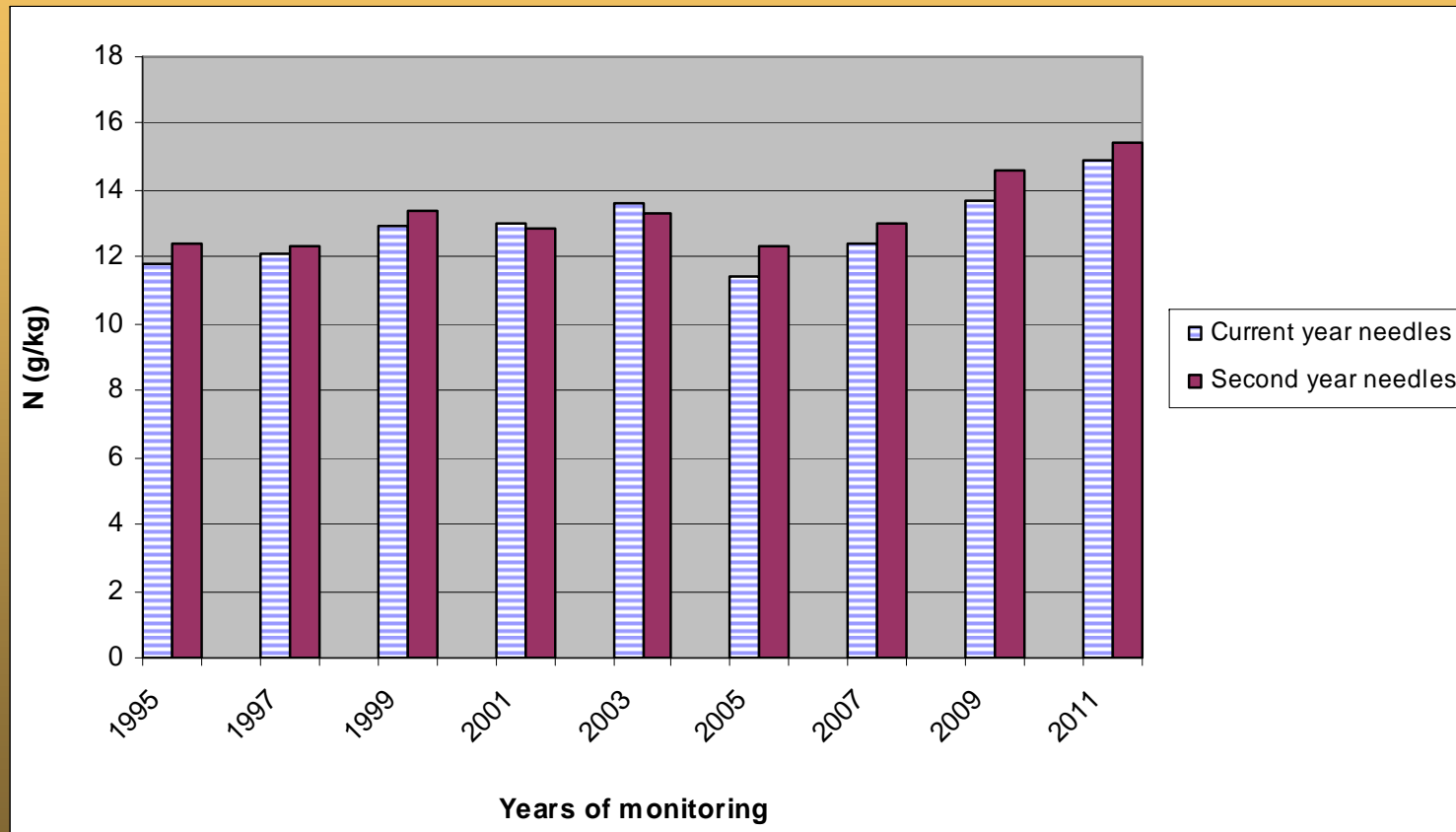


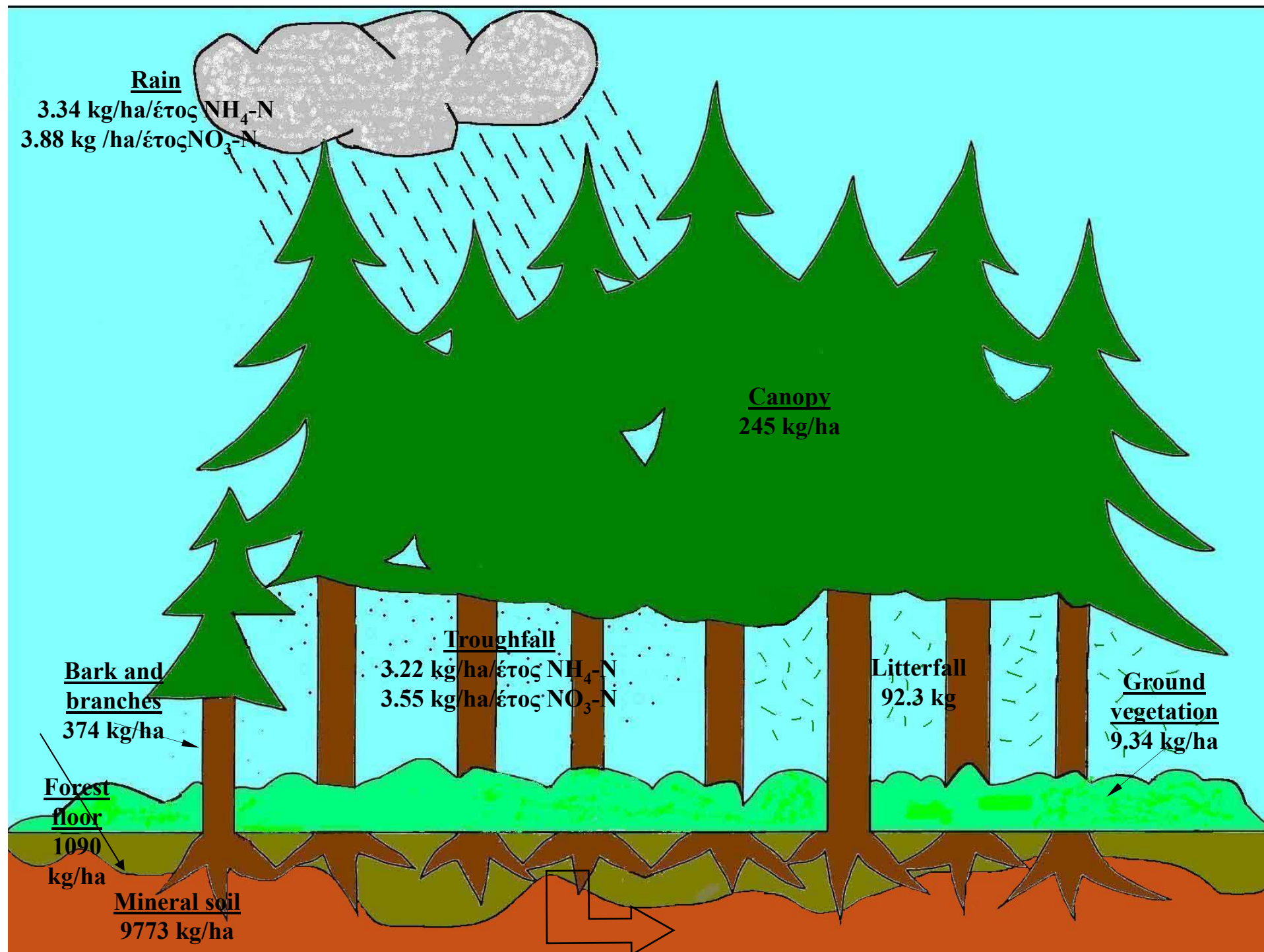


## Bulk and throughfall deposition fluxes (kg/ha/yr) of inorganic N over time



## Concentrations (g/kg) of N in current and second year needles over time







The test of randomness of the N concentration in the current and second year needles year needles of the fir did not show any significant trend in time.

In the space time 2009-2013 the median values of NO<sub>3</sub>-N in soil solution ranged in the 20 cm depth from 0.045 to 0.433 mg/L and in the 65 cm depth from 0.022 to 0.448 mg/L

## **Reasons for N retention in the forest soil of the fir stand**

1. The ratio of C/N does not seem to be related with N leaching. This finding has been confirmed by other works.
2. The N deposition fluxes in throughfall are not high.
3. It is probable that the dense ground vegetation absorbs some N in soil solution.

## **Conclusions**

1. For the time being the fir stand is not saturated with N.
2. The N concentrations in needles and the nitrate concentrations in soil solutions have to be monitored in case of a change.