



Ilse A. Rasmussen, Margrethe Askegaard & Jørgen E. Olesen, Danish Institute of Agricultural Sciences

Management of perennial weeds and nitrogen leaching in arable cropping systems

Organic Crop Rotation Experiment



Crop rotation: proportion of cereals ~ nitrogen fixing crops

Manure: with and without

Catch crops: with and without

1997-2004

Rotation 1 (R1)	Rotation 2 (R2)	Rotation 4 (R4)
Spring barley:ley ⁺	Spring barley:ley ⁺	Cereal ^{*+}
Grass-clover	Grass-clover	Cereal ^{*+}
Spring cereal ^{*+}	Winter cereal ^{*+}	Cereal ^{*+}
Pulse [*]	Pulse [*]	Pulse ^(*)

^{*}: Use of catch crop ⁺: Use of manure

Control of perennial weeds



Stubble cultivation

- without catch crops
- only when perennial weeds
- 2 – 8 treatments

Summer fallow at Jyndevad

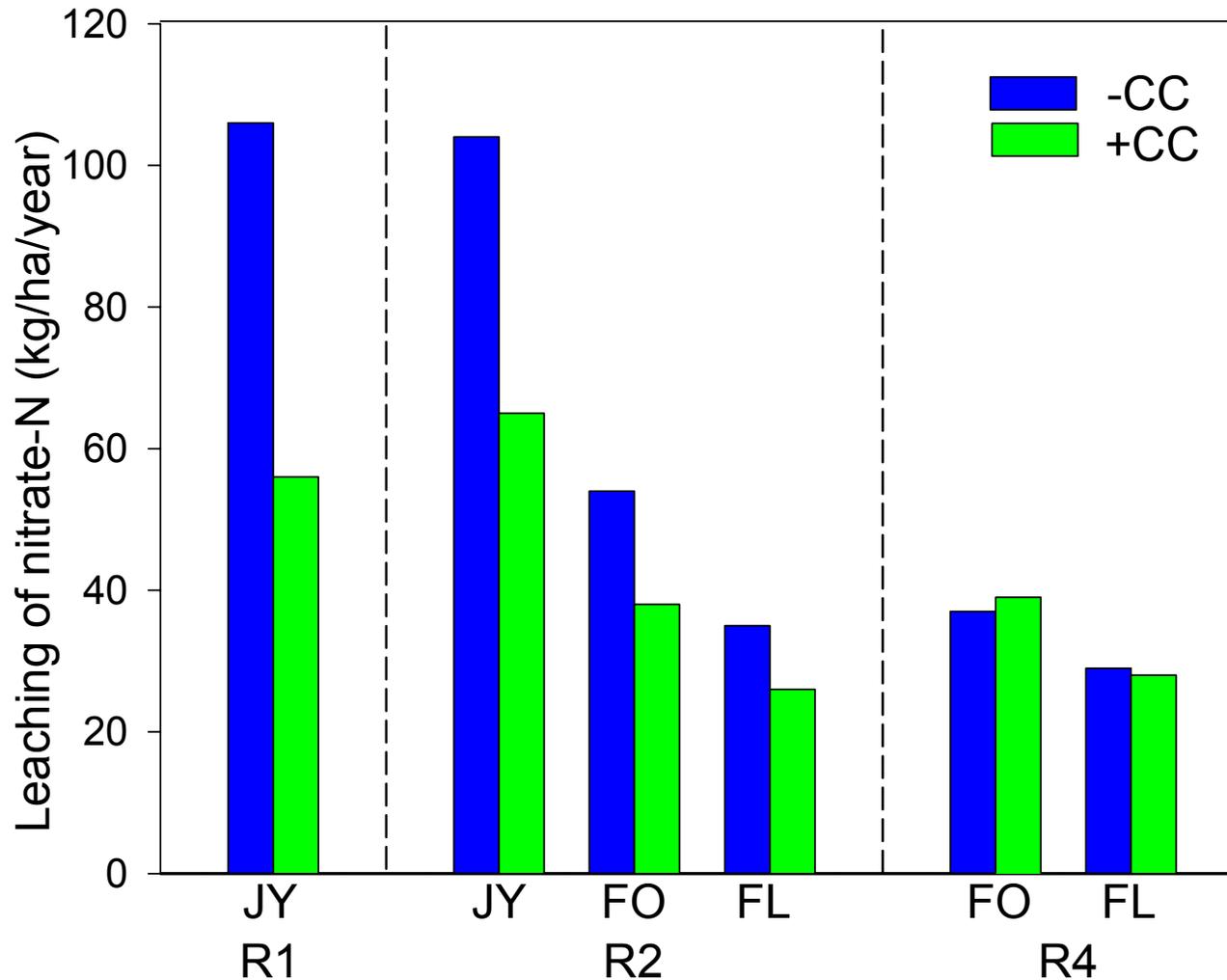
- from 2000 after grass-clover
- weekly treatments for 4-6 weeks
- followed by sowing of catch crops

Ministry of Food, Agriculture and Fisheries
Danish Institute of Agricultural Sciences



Perennial weeds & nitrogen leaching
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Nitrate leaching in each rotation at each location

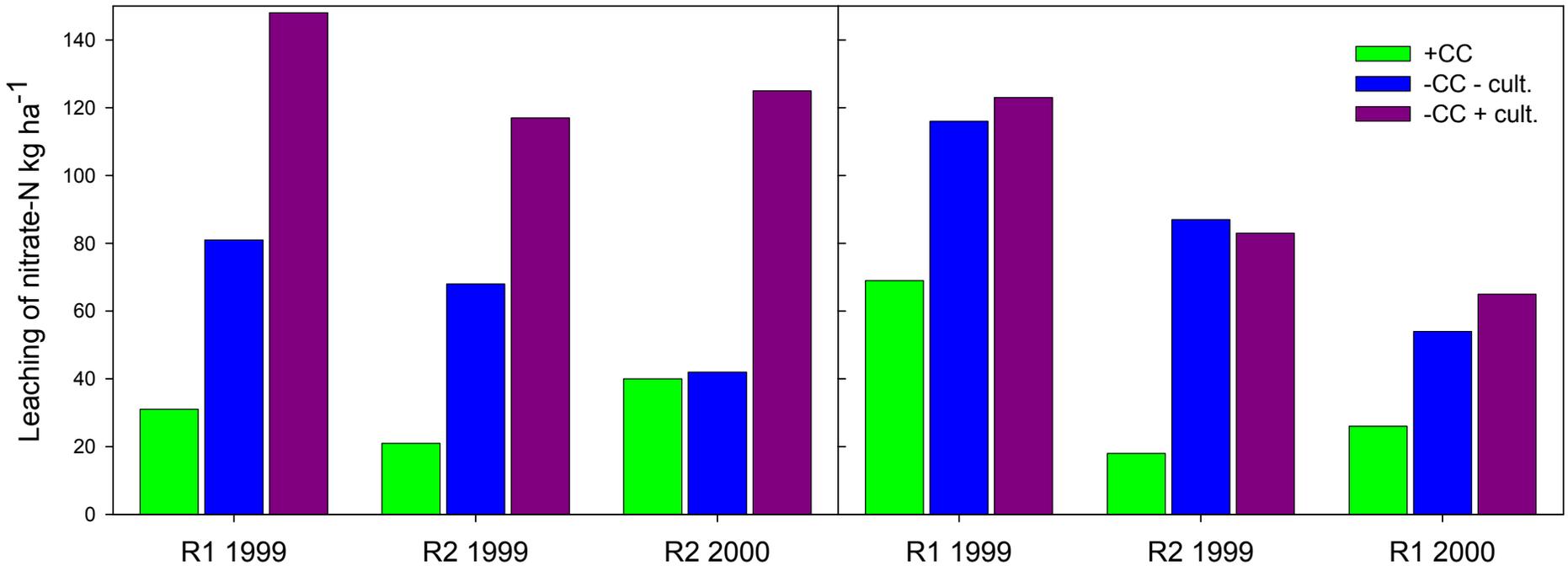


N-leaching at Jynde vad with or without catch crops and stubble cultivation

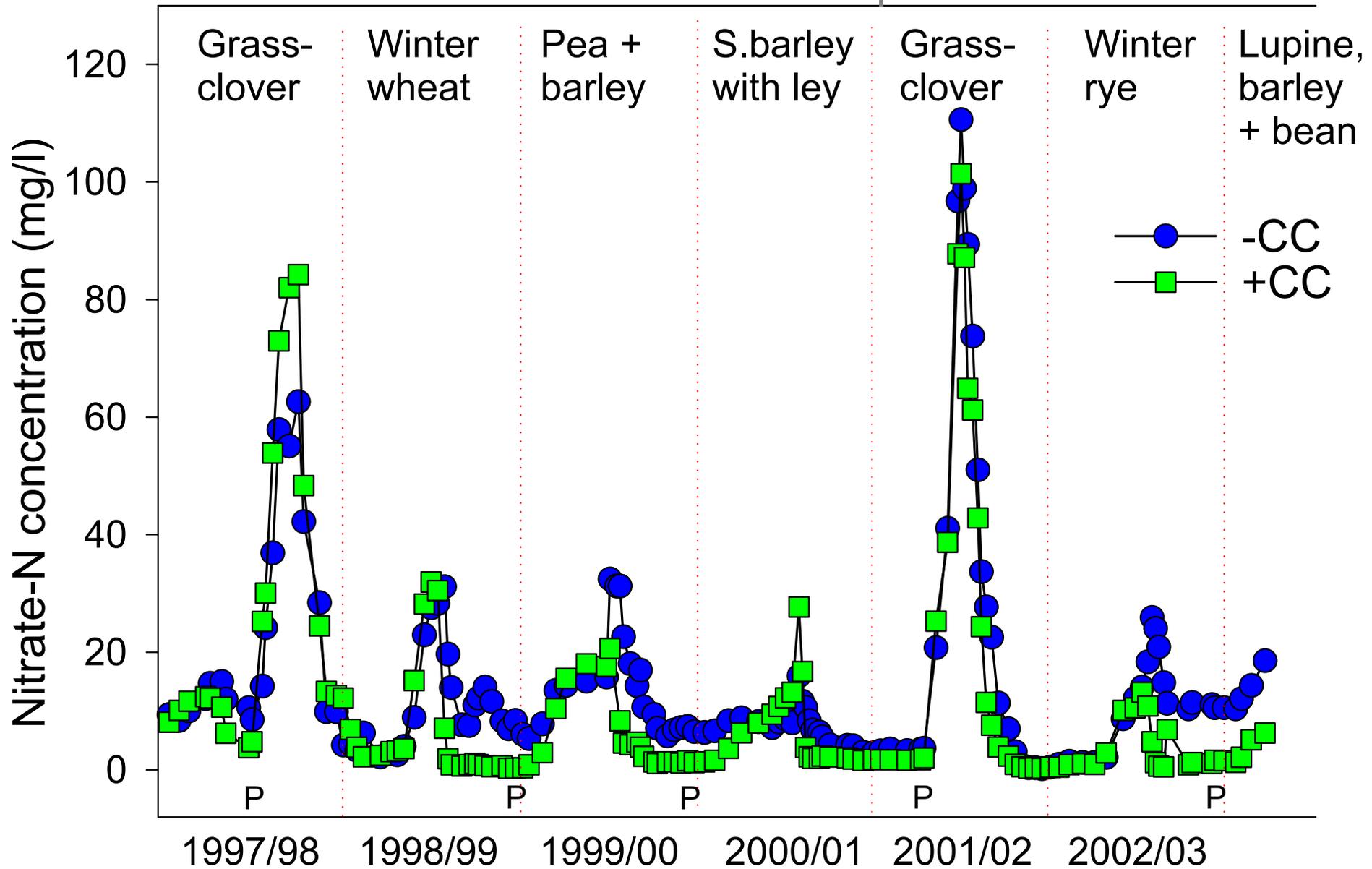


Pulses

Cereals

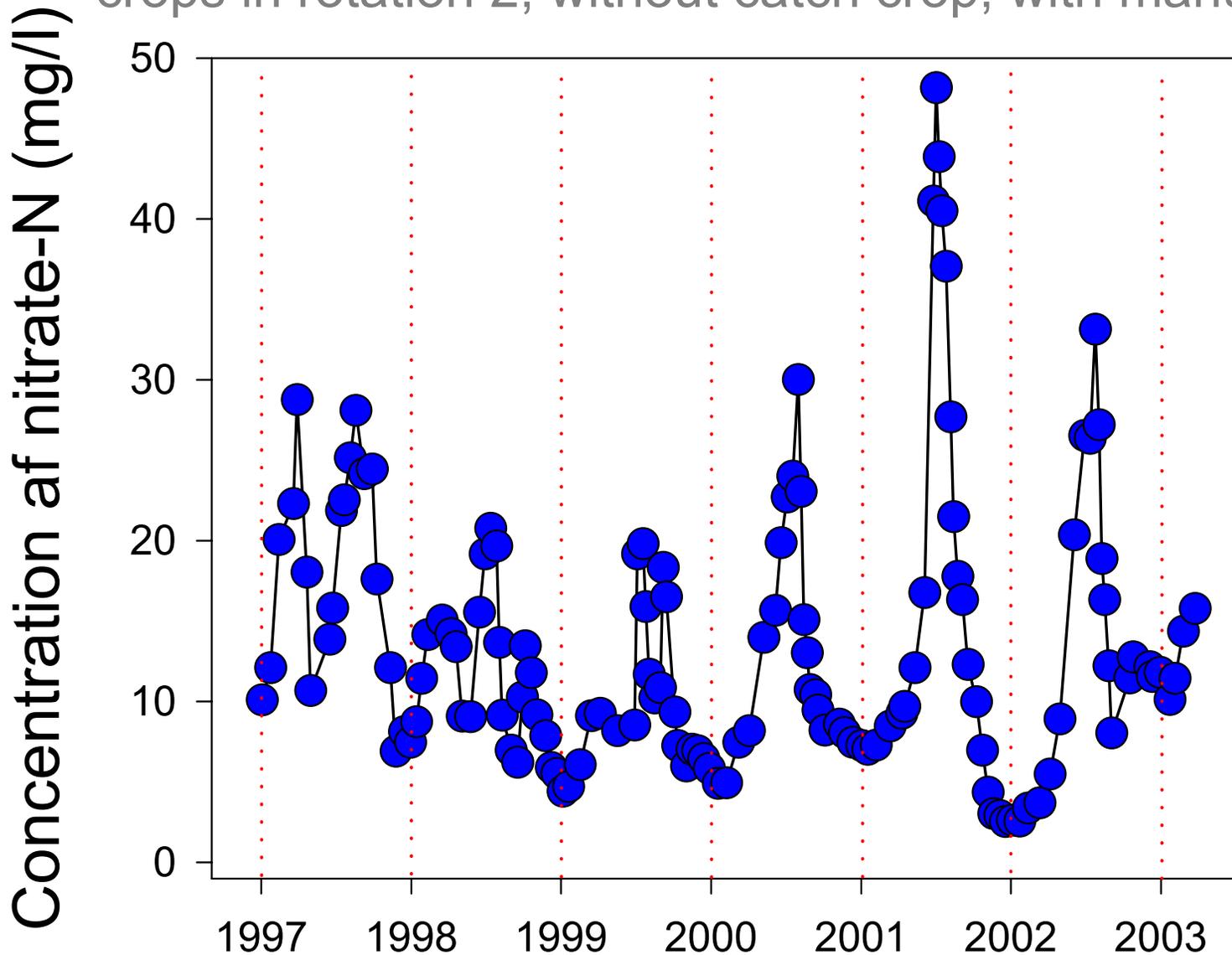


Nitrate concentrations at Jynde vad with or without catch crops

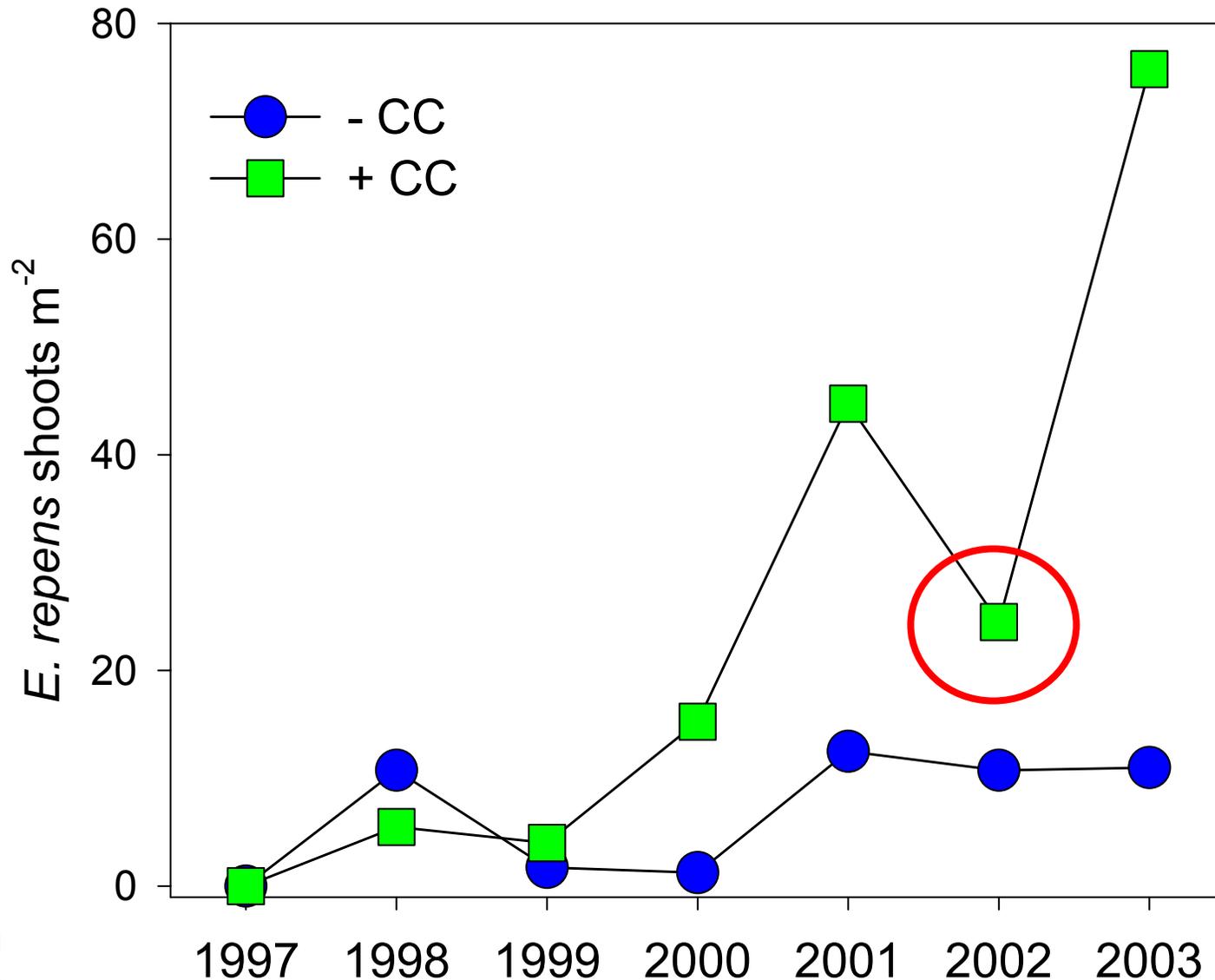




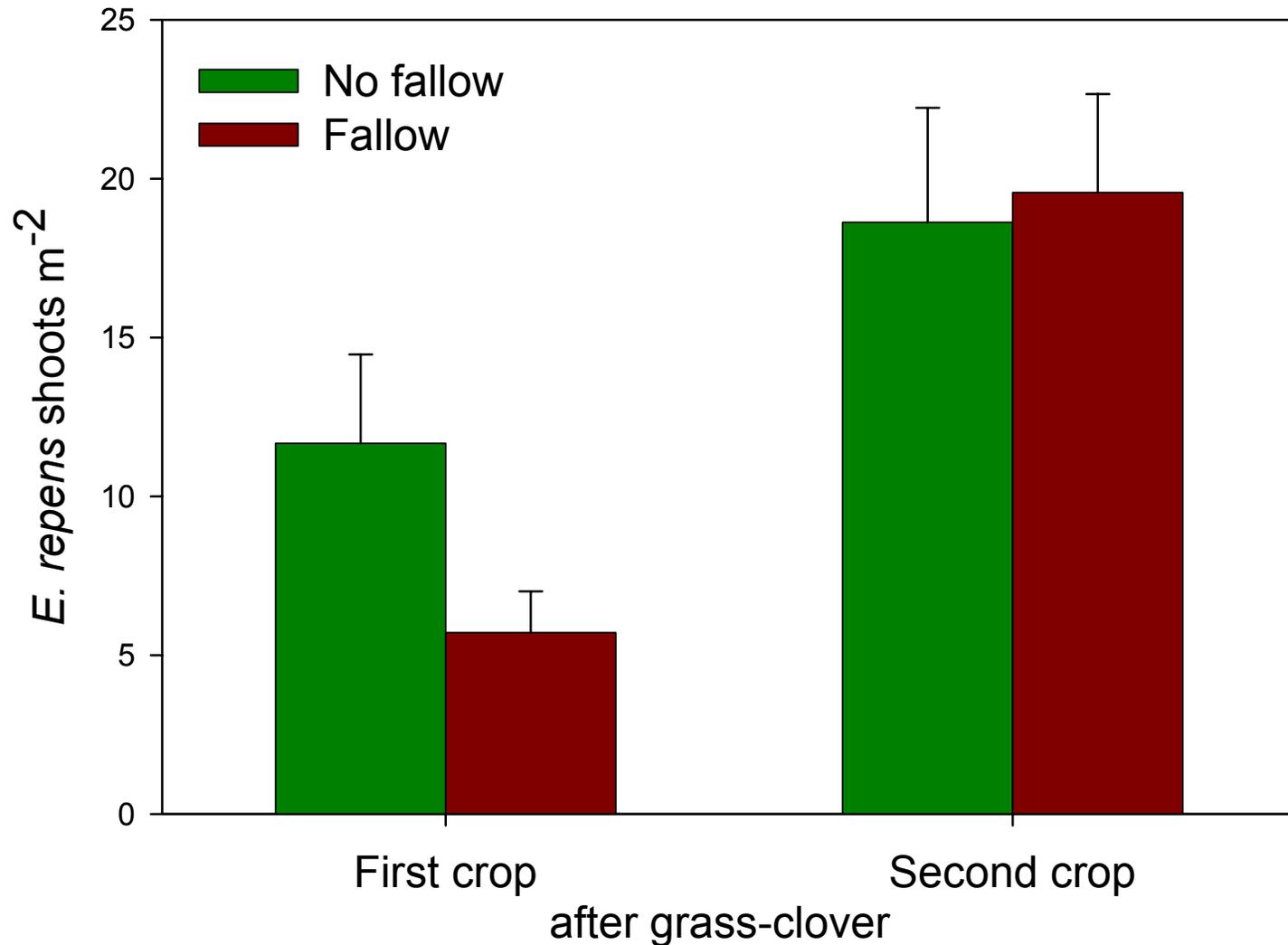
Concentrations of nitrate-N at Jyndevad, mean of all crops in rotation 2, without catch crop, with manure



E. repens shoots in spring barley at Jynde vad with and without catch crops

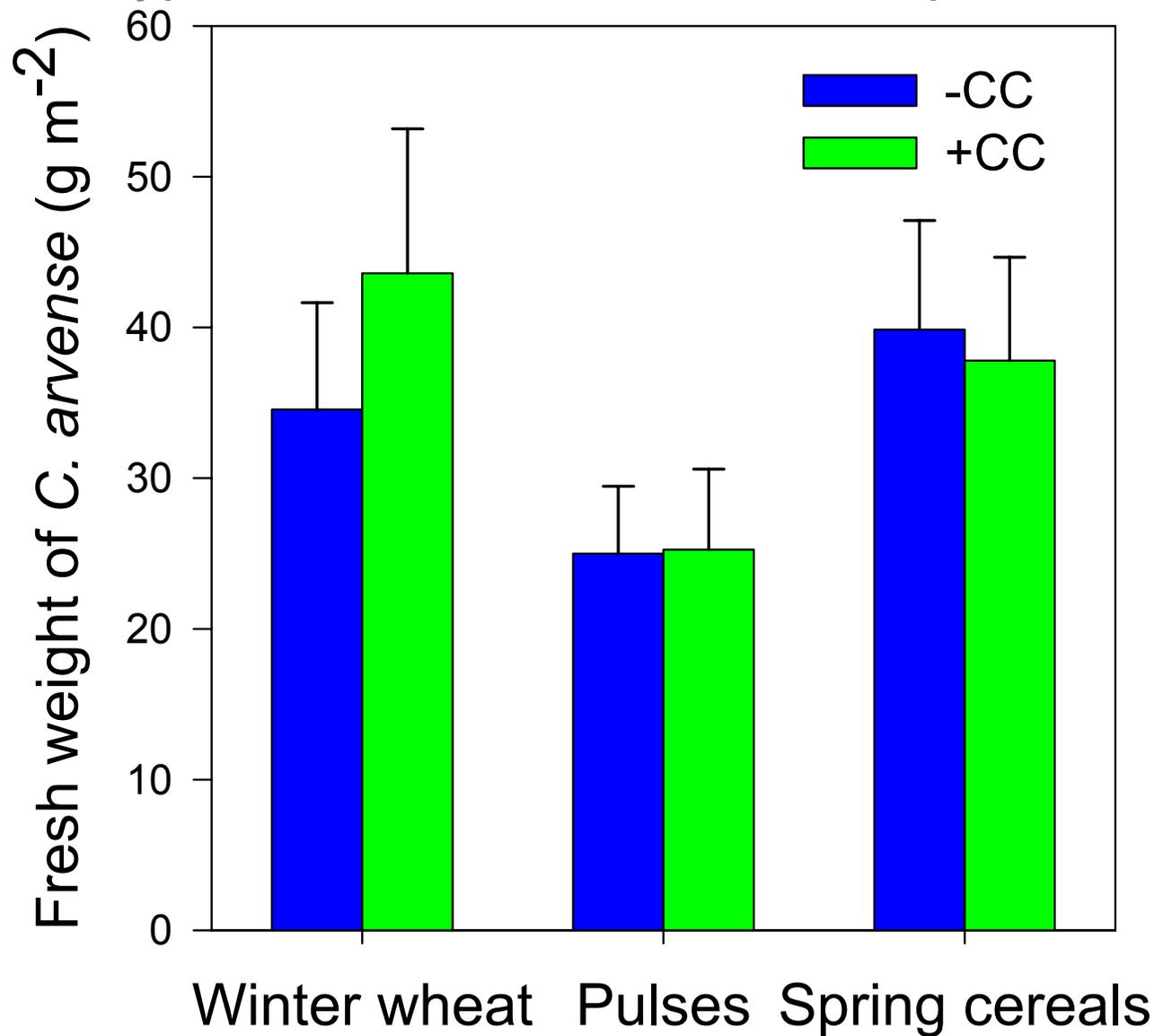


E. repens shoots at Jynde vad in first and second crop after grass-clover with or without summer fallow



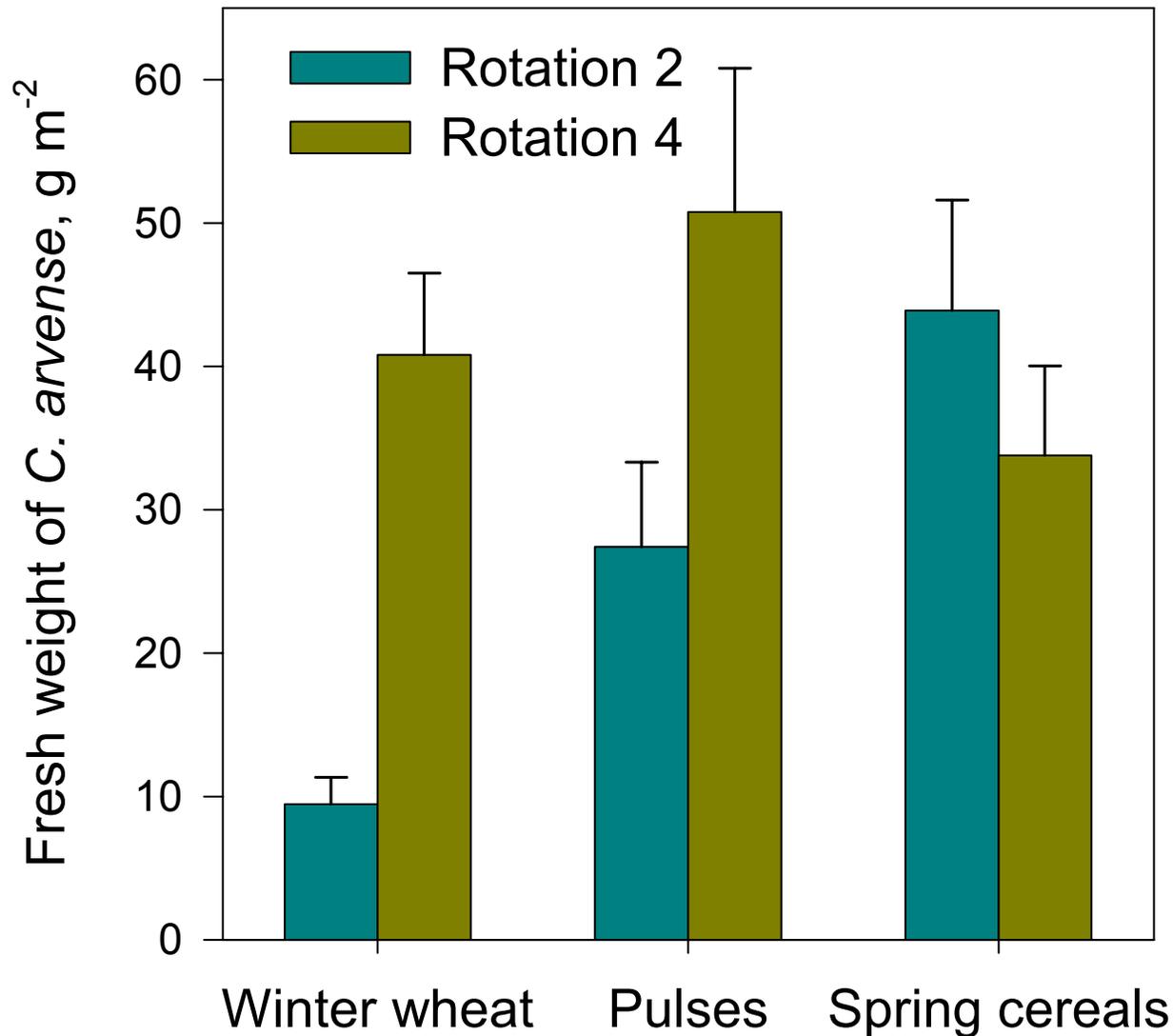


C. arvensis biomass at Flakkebjerg in different crop types with and without catch crops





C. arvensis biomass at Flakkebjerg in different crop types in two rotations





- Use of catch crops reduce nitrate leaching in systems with grass-clover
- No difference in systems without grass-clover
- Use of catch crops precludes stubble cultivation
- Stubble cultivation seems to increase nitrate leaching after pulses



- Stubble cultivation reduces *E. repens* infestations
- Stubble cultivation does not reduce *C. arvensis* biomass



- Summer fallow increases risk of nitrate leaching on sandy soil
- Summer fallow reduces *E. repens* infestations
 - mainly the first year after fallow



- Grass-clover may increase nitrogen leaching without use of catch crops
- Grass-clover reduces *C. arvensis*