

# Network analysis of grasslands

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## Networks per groups

## Results

### *Permanent grassland*

The graph on permanent grassland contains a total of 1,477 edges, including 878 positive and 599 negative edges. The top 30 positive edges show strong relationships among microorganisms, earthworms, and abiotic factors, with the highest weight being between microoppg and microherbofungi microarthropods. In contrast, the top 30 negative edges indicate notable negative associations primarily among nematodes, microorganisms, and earthworms, with the strongest negative relationship between nemaherb and nemabact nematodes.

### *Productive multispecies*

The graph on productive multispecies contains a total of 1,419 edges, including 802 positive and 617 negative edges. The top 30 positive edges reveal strong connections among microorganisms, earthworms, and abiotic factors, with the highest weight being between microoppg and microherbofungi microarthropods. Conversely, the top 30 negative edges display significant negative associations primarily among nematodes, microorganisms, and earthworms, with the strongest negative relationship between nemaherb and nemabact nematodes.

### *Semi-natural*

The semi-natural graph contains a total of 1,530 edges, including 777 positive and 753 negative edges. The top 30 positive edges show strong connections among earthworms, microarthropods, and microbial groups, with the highest weight between wormdiv and worm\_ens earthworm. On the other hand, the top 30 negative edges display significant negative associations among abiotic factors, nematodes, and microorganisms, with the strongest negative relationship between nema\_ci and nema\_ei nematodes.

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## Statistics for graph Permanent grassland:
##
## # Positive edges: 878
## # Negative edges: 599
## # Total edges: 1477
##
## # Top 30 Positive Edges:
##      from          to      group    weight
## 1  microoppg microherbofungi microarthropods 1.0000000
## 2    wormdiv      worm_ens      earthworm 1.0000000
## 3 bacteriaplfa      gramneg      microbial 0.9964851
## 4 actinomyceta      grampos      microbial 0.9767590
## 5 bacteriaplfa actinomyceta      microbial 0.9523943
## 6 actinomyceta      gramneg      microbial 0.9504440
```

## 7	nemapredfoot	nemapred	nematodes	0.9469969
## 8	bacteriaplfa	grampos	microbial	0.9448631
## 9	gramneg	grampos	microbial	0.9356726
## 10	fungiplfa	mycorrhiza	microbial	0.9294547
## 11	mycorrhiza	gramneg	microbial	0.9222615
## 12	bacteriaplfa	mycorrhiza	microbial	0.9031746
## 13	gramratio	gramratio2	microbial	0.9002924
## 14	fungiplfa	gramneg	microbial	0.8835993
## 15	nema_ei	nemabactfoot	nematodes	0.8811189
## 16	wormab	endogeic	earthworm	0.8754386
## 17	som010	saprophyta	abiotic	0.8752937
## 18	wormbiomass	anecic	earthworm	0.8752805
## 19	fungiplfa	bacteriaplfa	microbial	0.8752210
## 20	endogeic	wormspecies	earthworm	0.8543056
## 21	microab	microfungib	microarthropods	0.8531469
## 22	nemaab	nemabactfoot	nematodes	0.8461538
## 23	mycorrhiza	grampos	microbial	0.8229626
## 24	actinomyceta	mycorrhiza	microbial	0.8194703
## 25	wormab	wormbiomass	earthworm	0.8091081
## 26	wormab	wormspecies	earthworm	0.8066405
## 27	ntot	som010	abiotic	0.7986002
## 28	som010	microspecies	abiotic	0.7962186
## 29	fungiplfa	protozoa	microbial	0.7887324
## 30	anecic	wormspecies	earthworm	0.7853500

##

## # Top 30 Negative Edges:

##	from	to	group	weight
## 570	nemabact	nemaomni	nematodes	-0.5944056
## 571	fungi_bacteriaplfa	nemaspecies	microbial	-0.5972614
## 572	gramneg	gramratio2	microbial	-0.6081787
## 573	actinomyceta	endogeic	microbial	-0.6102378
## 574	microfungib	wormdiv	microarthropods	-0.6153846
## 575	microfungib	worm_ens	microarthropods	-0.6153846
## 576	protozoa	endogeic	microbial	-0.6186301
## 577	fungiplfa	gramratio2	microbial	-0.6207718
## 578	microab	wormdiv	microarthropods	-0.6293706
## 579	microab	worm_ens	microarthropods	-0.6293706
## 580	nemaab	nemafungi	nematodes	-0.6315828
## 581	mycorrhiza	gramratio2	microbial	-0.6414232
## 582	microab	endogeic	microarthropods	-0.6619975
## 583	micropredators	endogeic	microarthropods	-0.6619975
## 584	microfungig	microomni	microarthropods	-0.6620427
## 585	mycorrhiza	gramratio	microbial	-0.6707788
## 586	fungiplfa	wormjuvfraction	microbial	-0.6807059
## 587	bacteriaplfa	gramratio	microbial	-0.6982456
## 588	mycorrhiza	wormjuvfraction	microbial	-0.7170574
## 589	gramneg	gramratio	microbial	-0.7183143
## 590	fungiplfa	gramratio	microbial	-0.7205635
## 591	nemaab	nemaomni	nematodes	-0.7412587
## 592	grampos	wormjuvfraction	microbial	-0.7759236
## 593	nemaomni	wormjuvfraction	nematodes	-0.7832168
## 594	actinomyceta	wormjuvfraction	microbial	-0.8380490
## 595	nema_ci	nemabactfoot	nematodes	-0.8391608
## 596	bacteriaplfa	wormjuvfraction	microbial	-0.8441344

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## 597          gramneg wormjuvfraction      microbial -0.8646869
## 598          nema_ci          nema_ei      nematodes -0.9230769
## 599          nemaherb          nemabact      nematodes -0.9370629
##
## Statistics for graph Productive multispecies:
##
## # Positive edges: 802
## # Negative edges: 617
## # Total edges: 1419
##
## # Top 30 Positive Edges:
##      from          to          group      weight
## 1  microppg microherbofungi microarthropods 1.0000000
## 2  wormdiv          worm_ens      earthworm 1.0000000
## 3  bacteriaplfa      gramneg      microbial 0.9893301
## 4  actinomyceta      grampos      microbial 0.9804491
## 5  nemabactfoot      nemabact      nematodes 0.9790210
## 6  bacteriaplfa      actinomyceta      microbial 0.9734287
## 7  microab          microfungib microarthropods 0.9597213
## 8  actinomyceta      gramneg      microbial 0.9558364
## 9  bacteriaplfa      grampos      microbial 0.9549937
## 10  nema_ei          nemabactfoot      nematodes 0.9370629
## 11  ntot            som010          abiotic 0.9333391
## 12  nema_ei          nemabact      nematodes 0.9300699
## 13  gramneg          grampos      microbial 0.9300555
## 14  cn              som030          abiotic 0.9263215
## 15 nemapredfoot      nemapred      nematodes 0.9255914
## 16  wormab          endogeic      earthworm 0.9230769
## 17  mycorrhiza      gramneg      microbial 0.9056997
## 18  ntot            gramneg      abiotic 0.9049520
## 19 bacteriaplfa      mycorrhiza      microbial 0.8964286
## 20 actinomyceta      mycorrhiza      microbial 0.8865471
## 21  som010          gramneg      abiotic 0.8745638
## 22  fungiplfa        protozoa      microbial 0.8579379
## 23  mycorrhiza      grampos      microbial 0.8558906
## 24  ntot            bacteriaplfa      abiotic 0.8551717
## 25  gramratio        gramratio2      microbial 0.8395756
## 26  wormspecies      wormdiv      earthworm 0.8361133
## 27  wormspecies      worm_ens      earthworm 0.8361133
## 28  som010          bacteriaplfa      abiotic 0.8351274
## 29  nemaab          nemabactfoot      nematodes 0.8321678
## 30 actinomyceta      nemapred      microbial 0.8247938
##
## # Top 30 Negative Edges:
##      from          to          group      weight
## 588  gramratio        wormbiomass      microbial -0.6035088
## 589  gramratio2        anecic      microbial -0.6042833
## 590  gramratio2 microspecies      microbial -0.6052408
## 591  nemaab          nemaomni      nematodes -0.6083916
## 592  nemaspecies      epigeic      nematodes -0.6227148
## 593  nemaomni      microherbg      nematodes -0.6363636
## 594  microomni        anecic microarthropods -0.6423026
## 595  mycorrhiza      gramratio2      microbial -0.6550432
## 596  nemaab          nema_ci      nematodes -0.6573427

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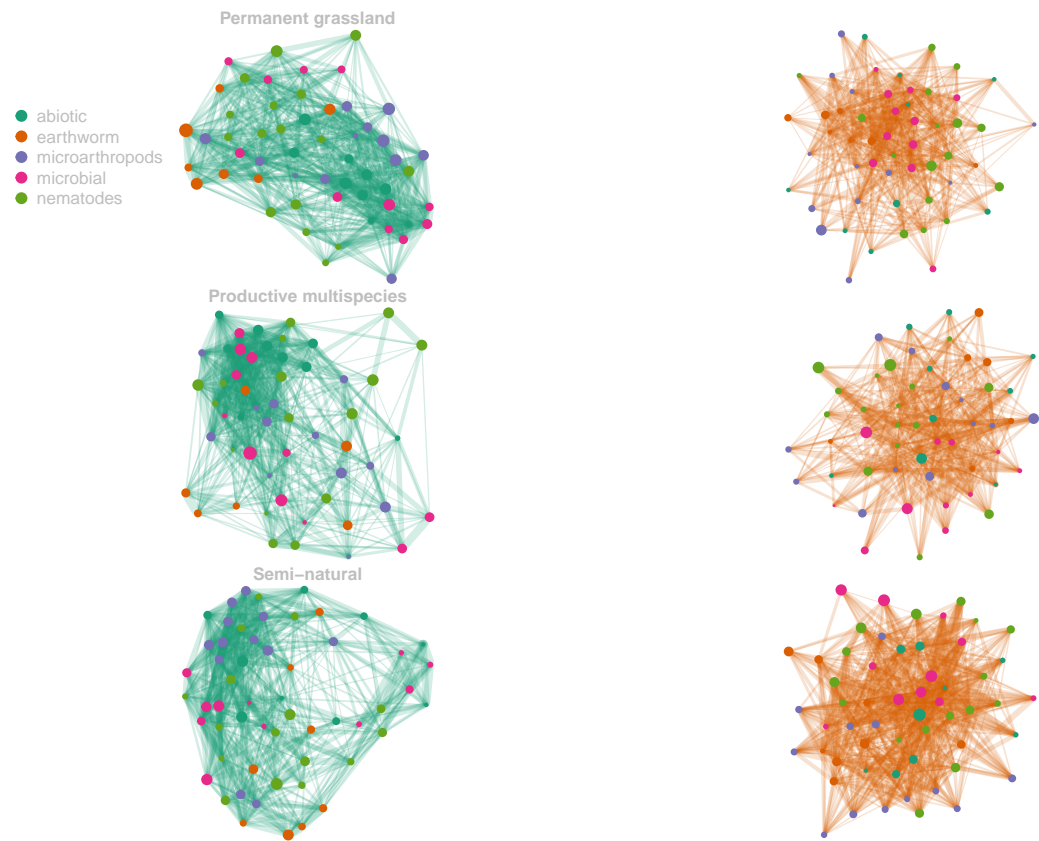
## 597      pot_nmin      epigeic      abiotic -0.6602352
## 598      micro_ens  microfungib  microarthropods -0.6643357
## 599      gramneg    gramratio2    microbial -0.6677212
## 600      microoppg  microherbg  microarthropods -0.6831155
## 601  microherbofungi  microherbg  microarthropods -0.6831155
## 602      bacteriaplfa    gramratio    microbial -0.6973724
## 603      gramratio    nemaomni    microbial -0.7040291
## 604      mycorrhiza    gramratio    microbial -0.7044524
## 605      ntot      gramratio2      abiotic -0.7077344
## 606      gramratio2    nemaomni    microbial -0.7487085
## 607      wormmib      epigeic      earthworm -0.7573168
## 608      som010      gramratio2      abiotic -0.7606852
## 609      gramneg    gramratio    microbial -0.7654428
## 610      nema_ci      nema_ei      nematodes -0.7762238
## 611      nema_ci  nemabactfoot    nematodes -0.8041958
## 612      som010      gramratio      abiotic -0.8049222
## 613      ntot      gramratio      abiotic -0.8231186
## 614      nemabactfoot    nemaherb    nematodes -0.8531469
## 615      nema_ei      nemaherb    nematodes -0.8601399
## 616      nema_ci      nemabact    nematodes -0.8811189
## 617      nemaherb      nemabact    nematodes -0.8811189
##
## Statistics for graph Semi-natural:
##
## # Positive edges: 777
## # Negative edges: 753
## # Total edges: 1530
##
## # Top 30 Positive Edges:
##      from      to      group      weight
## 1      wormdiv      worm_ens      earthworm 1.0000000
## 2      microoppg  microherbofungi  microarthropods 0.9860140
## 3      bacteriaplfa      gramneg      microbial 0.9819570
## 4      wormab      endogeic      earthworm 0.9754446
## 5      actinomyceta      grampos      microbial 0.9697319
## 6      bacteriaplfa      grampos      microbial 0.9673751
## 7      bacteriaplfa  actinomyceta      microbial 0.9273574
## 8      gramneg      grampos      microbial 0.9174451
## 9      micro_ens      microfungig  microarthropods 0.9071818
## 10     nemapredfoot      nemapred      nematodes 0.8881119
## 11     microab  microherbofungi  microarthropods 0.8811189
## 12     micro_ens  micropredators  microarthropods 0.8741259
## 13     actinomyceta      gramneg      microbial 0.8713673
## 14     microfungig  micropredators  microarthropods 0.8651502
## 15     microab      microfungib  microarthropods 0.8601399
## 16     microab  micropredators  microarthropods 0.8601399
## 17     microab      microoppg  microarthropods 0.8531469
## 18     microspecies      micro_ens  microarthropods 0.8421104
## 19     nema_ei      nemabactfoot    nematodes 0.8391608
## 20     nemaab      nemabactfoot    nematodes 0.8321678
## 21     microab      microherbb  microarthropods 0.8321678
## 22     wormspecies      wormdiv      earthworm 0.8312795
## 23     wormspecies      worm_ens      earthworm 0.8312795
## 24     microab      microfungig  microarthropods 0.8266212

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## 25      microfungib microherbofungi microarthropods 0.8251748
## 26      microfungib      microoppg microarthropods 0.8111888
## 27      microspecies micropredators microarthropods 0.8105313
## 28      nemafungifoot      nemafungi      nematodes 0.7986002
## 29 microherbfunig micropredators microarthropods 0.7953957
## 30      pot_nmin      gramneg      abiotic 0.7930392
##
## # Top 30 Negative Edges:
##      from      to      group      weight
## 724      som010      nemapred      abiotic -0.6666926
## 725      pot_nmin      som030      abiotic -0.6760080
## 726      pot_nmin      microfungib      abiotic -0.6853147
## 727      pot_nmin      microherbofungi      abiotic -0.6993007
## 728      nema_ci      nemabactfoot      nematodes -0.6993007
## 729      gramneg      nemafungifoot      microbial -0.7144498
## 730      wormmib      endogeic      earthworm -0.7157939
## 731      mycorrhiza      nemafungi      microbial -0.7171545
## 732 fungi_bacteriaplfa      actinomyceta      microbial -0.7245890
## 733      gramneg      nemafungi      microbial -0.7246484
## 734      pot_nmin      microoppg      abiotic -0.7272727
## 735      som010      nemapredfoot      abiotic -0.7301871
## 736      wormab      wormmib      earthworm -0.7342657
## 737      saprophyta      nemaherb      microbial -0.7367295
## 738      cn      wormspecies      abiotic -0.7413142
## 739      bacteriaplfa      nemafungi      microbial -0.7553619
## 740 fungi_bacteriaplfa      nemaherb      microbial -0.7678481
## 741      bacteriaplfa      nemafungifoot      microbial -0.7682006
## 742      pot_nmin      microherbb      abiotic -0.7692308
## 743 fungi_bacteriaplfa      gramneg      microbial -0.7702414
## 744      pot_nmin      pal      abiotic -0.7762238
## 745      grampos      nemafungifoot      microbial -0.7830488
## 746      actinomyceta      nemafungifoot      microbial -0.7986002
## 747 fungi_bacteriaplfa      grampos      microbial -0.8114616
## 748      actinomyceta      nemafungi      microbial -0.8175439
## 749      grampos      nemafungi      microbial -0.8186049
## 750      nemaherb      nemabact      nematodes -0.8231186
## 751      mycorrhiza      nema_ens      microbial -0.8313673
## 752      bacteriaplfa fungi_bacteriaplfa      microbial -0.8343562
## 753      nema_ci      nema_ei      nematodes -0.9020979

```



● abiotic      Permanent grassland  
● earthworm  
● microarthropods  
● microbial  
● nematodes

Productive multispecies

Semi-natural

