Metadata form of Silva Fennica

This form is designed for writing the elements of metadata, which are used in the description of research materials such as data and codes. The form is based on the work done in the Work Group "Description of research materials" under the Finnish Open Science Coordination.

Item	Description	Responsible
Name of the data / code	Ground vegetation cover data at species level in nitrogen fertilization experiments in boreal Scots pine and Norway spruce stands in Eastern Finland	Author
Author & ORCID	Männistö Elisa [1] ORCID 0000-0003-3869-6739, Jetsonen Johanna [2] ORCID 0009-0006-4878-8951, Peltola Heli [1] ORCID 0000-0003-1384-9153	Author
Authors' affiliation(s)	[1] Faculty of Science, Forestry and Technology, University of Eastern Finland, P.O. Box 111, 80101 Joensuu, Finland, **https://ror.org/00cyydd11** [2] Department of Forest Sciences, University of Helsinki, P.O. Box 27, 00014 Helsinki, Finland, **https://ror.org/040af2s02** [3] Natural Resources Institute Finland, Latokartanonkaari 9, 00790 Helsinki, Finland, **https://ror.org/02hb7bm88**	Author
Owner of the material	University of Eastern Finland, **https://ror.org/00cyydd11**	Author
Publisher	Zenodo	Author
Funder	Heli Peltola, University of Eastern Finland, **https://ror.org/00cyydd11**, **https://ror.org/02vtq1a86**, **https://ror.org/05k73zm37**	Author
Description	The aim was to study the short-term effects of nitrogen fertilization on the cover of vascular plant and moss species in Scots pine and Norway spruce dominated stands in Eastern Finland. Dataset contains vegetation covers (%) on a species level for vascular plants and mosses from four nitrogen (N) fertilization experiments, of which two are Scots pine dominated stands and two Norway spruce dominated stands located in Eastern Finland. The dataset also contains the measurement year, the location of each study site, the targeted fertilization level (0, 150, and 200 kg N ha^{-1}), and the realized fertilization dose (kg N ha^{-1}) measured with a funnel trap (see Muhonen et al., 2025, Silva Fennica, vol 59 no. 1 article id 24026). Here, same N dose was assigned to three subplots located in a same plot. The full dataset has been divided into two data files, one for the Scots pine stands data and the other for the Norway spruce stands data.	Author
Methods	The species covers were visually estimated as a projective cover (%) from 324 subplots with radius of 0.5 m before fertilization treatment (2018 pine/2019 spruce) and two times after nitrogen (N) fertilization (2021 and 2022). The measured species represented four plant groups: bryophytes, shrubs, grasses, and herbs that also included pteridophytes. The statistical data analyses were made using R version 4.5.3. and code by Elisa Männistö. Multivariate generalized linear models were built separately to Scots pine and Norway spruce stands data for testing the effects of N dose, research site, study year, and their interactions on the species covers. Linear mixed effects models with the same fixed model design were then fitted separately for each species showing significant ($p < 0.05$) term(s). The impact of year on species cover in each site was tested with Tukey's pairwise comparisons. Non-metric multidimensional scaling (NMDS) and Bray-Curtis dissimilarity were used to visualize the species composition between fertilized and unfertilized subplots over the	Author

	three years. Furthermore, multivariate permutational analyses of variance (PERMANOVA) with Bray-Curtis distance and 999 permutations were used to test for effects of fertilization and measurement year on all species communities. We also tested multivariate homogeneity of species community dispersions to assess similarity or dissimilarity between the fertilized and unfertilized plant communities over the years.	
Variables	Unique identifier for each vegetation plot (0.5m^2) comprised of larger plot id (3-number code) plus subplot identifier (a-c) (ID); Year of survey (Year); Research site (Site); Fertilization treatment (Treatment; kg N ha^{-1}); The amount of nitrogen caught in the plots with fertilizer funnel traps (Namount; kg N ha^{-1}); 3-number plot identifier as marked in field (Plot); Subplot identifier for vegetation inventory (Subplot); Fake species that has the same cover value 1 % in each subplot, added to the dataset so that no subplot has cover of '0' or 'na' for fitting NMDS ordinations (Fake); Different species and species groups covers (%)	Author
Author keywords	Ground vegetation; Nitrogen fertilization; Understory vegetation; Vegetation inventory	Author
Vocabulary keywords (community standard)	Community composition; Forest management; Picea abies; Pinus sylvestris; Plant communities https://agrovoc.fao.org/browse/agrovoc/en/	Author
Discipline	Forest science	Archive/Repository/Publisher
Type of material	Research data and analytical code	Author
Language	eng	Author
Time range covered	2018-2022	Author
Geographic region	FIN	Author
Version	Version 1	Author
File format(s)	.csv, .txt	Author
Availability of the materials (open, embargo, registration, limited, registration required)	Open	Author
Justification for access restrictions		Author
Licence	CC BY 4.0	Author
Connections with other research materials	The realized N fertilization doses of plots and tree attribute measurements in the same experiment have been published (HasPart) in the research article Muhonen, O., Peltola, H., Laurén, A., Ikonen, V.-P., Nevalainen, J., Pikkarainen, L., Kilpeläinen, A., Launiainen, S., Palviainen, M., (2025) Spatial evenness of fertilization and short-term volume growth responses of Scots pine and Norway spruce to fertilization intensity, Silva Fennica vol 59 no. 1 article id 24026. https://doi.org/10.14214/sf.24026	Author
Access to the connected research materials	Muhonen et al (2025) research data has been published and is available at Zenodo: Peltola, H. M. (2024). Nitrogen fertilization plot level data - a Finnish case study [Data set]. Zenodo. https://doi.org/10.5281/zenodo.11066705	Author
Codes only: hardware/software requirements for running the code	R is needed for running the code.	Author
Connections to other products of research	Jetsonen J., Laurén A., Peltola H., Muhonen O., Nevalainen J., Ikonen V.-P., Kilpeläinen A., Tuittila E.-S., Männistö E., Kokkonen N., Palviainen	Author

	M. (2024). Effects of nitrogen fertilization on the ground vegetation cover and soil chemical properties in Scots pine and Norway spruce stands. Silva Fennica vol. 58 no. 1 article id 23058. https://doi.org/10.14214/sf.23058	
Personal data	The material does not contain personal data.	Author
Confidential or secret data	The material does not contain confidential or secret information.	Author
Publication date	Date of publication in an archive or repository.	Archive/Repository/Publisher
Preservation policy	The material will be permanently preserved in an open access data repository.	Author
Permanent identifier (PID)	Unambiguous, permanent identifier of the material. The identifier may be DOI, URN or accession number.	Archive/Repository/Publisher