

Supporting material

Studies included in the meta-analysis:

- Adamek, M. 2009. Effects of increased nitrogen input on the net primary production of a tropical lower montane rain forest, Panama. Niedersächsischen Staats-und Universitat sbibliothek Gottingen.
- Adamek, M., M. D. Corre, and D. Holscher. 2011. Responses of fine roots to experimental nitrogen addition in a tropical lower montane rain forest, Panama. *Journal of Tropical Ecology* **27**:73-81.
- Boxman, A. W., K. Blanck, T. E. Brandrud, B. A. Emmett, P. Gundersen, R. F. Hogervorst, O. J. Kjonaas, H. Persson, and V. Timmermann. 1998. Vegetation and soil biota response to experimentally-changed nitrogen inputs in coniferous forest ecosystems of the NITREX project. *Forest Ecology and Management* **101**:65-79.
- Brassard, B. W., H. Y. H. Chen, Y. Bergeron, and D. Pare. 2011. Differences in fine root productivity between mixed- and single-species stands. *Functional Ecology* **25**:238-246.
- Brunner, I., E. G. Pannatier, B. Frey, A. Rigling, W. Landolt, S. Zimmermann, and M. Dobbertin. 2009. Morphological and physiological responses of Scots pine fine roots to water supply in a dry climatic region in Switzerland. *Tree Physiology* **29**:541-550.
- Davis, J. P., B. Haines, D. Coleman, and R. Hendrick. 2004. Fine root dynamics along an elevational gradient in the southern Appalachian Mountains, USA. *Forest Ecology and Management* **187**:19-34.
- Dress, W. J. and R. E. J. Boerner. 2001. Root dynamics of southern Ohio oak-hickory forests: influences of prescribed fire and landscape position. *Canadian Journal of Forest Research* **31**:644-653.
- Fang, Q. L. and L. Q. Sha. 2005. Study of fine roots biomass and turnover in the rubber plantation of Xishuangbanna. *Journal of Central South Forestry University* **25**:40-44.
- Finer, L. and J. Laine. 2000. The ingrowth bag method in measuring root production on peatland sites. *Scandinavian Journal of Forest Research* **15**:75-80.
- Fisk, M. C., S. K. Schmidt, and T. R. Seastedt. 1998. Topographic patterns of above- and belowground production and nitrogen cycling in Alpine tundra. *Ecology* **79**:2253-2266.
- Gao, Y. Z., M. Giese, S. Lin, B. Sattelmacher, Y. Zhao, and H. Brueck. 2008. Belowground net primary productivity and biomass allocation of a grassland in Inner Mongolia is affected by grazing intensity. *Plant and Soil* **307**:41-50.

- Garcia-Pausas, J., P. Casals, J. Romanya, S. Vallecillo, and M. T. Sebastia. 2011. Seasonal patterns of belowground biomass and productivity in mountain grasslands in the Pyrenees. *Plant and Soil* **340**:315-326.
- Gaul, D., D. Hertel, W. Borken, E. Matzner, and C. Leuschner. 2008a. Effects of experimental drought on the fine root system of mature Norway spruce. *Forest Ecology and Management* **256**:1151-1159.
- Gaul, D., D. Hertel, and C. Leuschner. 2008b. Effects of experimental soil frost on the fine-root system of mature Norway spruce. *Journal of Plant Nutrition and Soil Science-Zeitschrift Fur Pflanzenernahrung Und Bodenkunde* **171**:690-698.
- Gaul, D., D. Hertel, and C. Leuschner. 2009. Estimating fine root longevity in a temperate Norway spruce forest using three independent methods. *Functional Plant Biology* **36**:11-19.
- Handa, I. T., F. Hagedorn, and S. Hattenschwiler. 2008. No stimulation in root production in response to 4 years of in situ CO₂ enrichment at the Swiss treeline. *Functional Ecology* **22**:348-358.
- Hansson, A. C. and O. Andren. 1986. Belowground plant-production in a perennial grass ley (*Festuca pratensis* Huds) assessed with different methods. *Journal of Applied Ecology* **23**:657-666.
- Hendricks, J. J., R. L. Hendrick, C. A. Wilson, R. J. Mitchell, S. D. Pecot, and D. L. Guo. 2006. Assessing the patterns and controls of fine root dynamics: An empirical test and methodological review. *Journal of Ecology* **94**:40-57.
- Hertel, D., M. A. Harteveld, and C. Leuschner. 2009. Conversion of a tropical forest into agroforest alters the fine root-related carbon flux to the soil. *Soil Biology & Biochemistry* **41**:481-490.
- Joslin, J. D. and G. S. Henderson. 1987. Organic-matter and nutrients associated with fine root turnover in a white oak stand. *Forest Science* **33**:330-346.
- Kiley, D. K. and R. L. Schneider. 2005. Riparian roots through time, space and disturbance. *Plant and Soil* **269**:259-272.
- Langley, J. A., P. Dijkstra, B. G. Drake, and B. A. Hungate. 2003. Ectomycorrhizal colonization, biomass, and production in a regenerating scrub oak forest in response to elevated CO₂. *Ecosystems* **6**:424-430.
- Li, J. Z., S. Lin, F. Taube, Q. M. Pan, and K. Dittert. 2011. Above and belowground net primary productivity of grassland influenced by supplemental water and nitrogen in Inner Mongolia. *Plant and Soil* **340**:253-264.
- Lukac, M., C. Calfapietra, and D. L. Godbold. 2003. Production, turnover and mycorrhizal colonization of root systems of three *Populus* species grown under elevated CO₂ (POPFACE). *Global Change Biology* **9**:838-848.
- Lukac, M. and D. L. Godbold. 2010. Fine root biomass and turnover in southern taiga estimated by root inclusion nets. *Plant and Soil* **331**:505-513.

- Marchesini, L. B., D. Papale, M. Reichstein, N. Vuichard, N. Tchebakova, and R. Valentini. 2007. Carbon balance assessment of a natural steppe of southern Siberia by multiple constraint approach. *Biogeosciences* **4**:581-595.
- Mei, L., J. C. Gu, Z. W. Zhang, and Z. Q. Wang. 2010. Responses of fine root mass, length, production and turnover to soil nitrogen fertilization in *Larix gmelinii* and *Fraxinus mandshurica* forests in Northeastern China. *Journal of Forest Research* **15**:194-201.
- Meinen, C., D. Hertel, and C. Leuschner. 2009. Root growth and recovery in temperate broad-leaved forest stands differing in tree species diversity. *Ecosystems* **12**:1103-1116.
- Metcalfe, D. B., P. Meir, and M. Williams. 2007. A comparison of methods for converting rhizotron root length measurements into estimates of root mass production per unit ground area. *Plant and Soil* **301**:279-288.
- Moser, G., C. Leuschner, M. Roderstein, S. Graefe, N. Soethe, and D. Hertel. 2010. Biomass and productivity of fine and coarse roots in five tropical mountain forest stands along an altitudinal transect in southern Ecuador. *Plant Ecology & Diversity* **3**:151-164.
- Neill, C. 1992. Comparison of soil coring and ingrowth methods for measuring belowground production. *Ecology* **73**:1918-1921.
- Neill, C. 1994. Primary production and management of seasonally flooded prairie marshes harvested for wild hay. *Canadian Journal of Botany* **72**:801-807.
- Pei, Z. Q., Y. Zhou, Y. R. Zheng, and C. W. Xiao. 2011. Contribution of fine root turnover to the soil organic carbon cycling of *Reaumuria soongorica* community in an arid ecosystem. *Chinese Journal of Plant Ecology* **35**:0-0.
- Persson, H. 1979. Fine-root production, mortality and decomposition in forest ecosystems. *Vegetatio* **41**:101-109.
- Persson, H. A. 1983. The distribution and productivity of fine roots in boreal forests. *Plant and Soil* **71**:87-101.
- Powell, S. W. and F. P. Day. 1991. Root production in four communities in the Great Dismal Swamp. *American Journal of Botany* **78**:288-297.
- Pridoehl, F. 2010. Fine root dynamics for three distinct northern Ontario forests: A comparison of approaches used to estimate fine root biomass, productivity, and turnover. Lakehead University, ON.
- Rodriguez, M. V., M. B. Bertiller, and A. Bisigato. 2007. Are fine roots of both shrubs and perennial grasses able to occupy the upper soil layer? A case study in the arid Patagonian Monte with non-seasonal precipitation. *Plant and Soil* **300**:281-288.
- Sanford, R. L. 1990. Fine root biomass under light gap openings in an Amazon rain forest. *Oecologia* **83**:541-545.

- Singh, B. 1998. Contribution of forest fine roots in reclamation of semiarid sodic soils. *Arid Soil Research and Rehabilitation* **12**:207-222.
- Sun, Y., J. Gu, H. Zhuang, D. Guo, and Z. Wang. 2011. Lower order roots more palatable to herbivores: a case study with two temperate tree species. *Plant and Soil* **347**:351-361.
- Symbula, M. and F. P. Day. 1988. Evaluation of two methods for estimating belowground production in a fresh-water swamp forest. *American Midland Naturalist* **120**:405-450.
- Tripathi, S. K., A. Sumida, H. Shibata, S. Uemura, K. Ono, and T. Hara. 2005. Growth and substrate quality of fine root and soil nitrogen availability in a young *Betula ermanii* forest of northern Japan: Effects of the removal of understory dwarf bamboo (*Sasa kurilensis*). *Forest Ecology and Management* **212**:278-290.
- Wang, W., J. Feng, and T. Oikawa. 2009. Contribution of root and microbial respiration to soil CO₂ efflux and their environmental controls in a humid temperate grassland of Japan. *Pedosphere* **19**:31-39.
- Wu, Y. B., J. Wu, Y. C. Deng, H. C. Tan, Y. G. Du, S. Gu, Y. H. Tang, and X. Y. Cui. 2011. Comprehensive assessments of root biomass and production in a Kobresia humilis meadow on the Qinghai-Tibetan Plateau. *Plant and Soil* **338**:497-510.