

organic matter in South Africa 2: A review on the influence of arable crop production. South African Journal of Science, 107(5-6), 35-42.

Du Toit, A.L., 1938. Geological and soil characteristics in relation to deterioration and conservation of natural resources, etc., in the Union. South African Journal of Science 35, 470-476.

Duda, J.J., Freeman, D.C., Emlen, J.M., Belnap, J., Kitchen, S.G., Zak, J.C., Sobek, E., Tracy, M., Montante, J., 2003. Differences in native soil ecology associated with invasion of the exotic annual chenopod, *Halogeton glomeratus*.

Biology and Fertility of S



Ehrenfeld, J.G, Ravit, B., edback in the plant-soil system. Annual Review of Enviro  75-115.

Einhellig, F.A., 1996. Interactions involving allelopathy in cropping systems. Agronomy Journal 88, 886-893.

Einhellig, F.A., 1999. An integrated view of allelochemicals amid multiple stresses, in: Inderjit, Dakshini, K.M.M., Foy C.L. (Eds.), *Principals and Practices in Plant Ecology: Allelochemical Interactions*. CRC Press, Boca Raton, pp. 479-494.

Eisenhauer, N, Dobiesc, T., Cesarza, S., Hobbie, S.E., Meyer, R.J., Worm, K.,

Reich, P.B., 2013. Plant diversity effects on soil food webs are stronger than those of elevated CO₂ and N deposition in a long-term grassland experiment. PNAS 110 (17), 6889-6894.

Eisenhauer, N., Milcu, A., Sabais, A.C.W., Bessler, H., Brenner, J., Engels, C., Klärner, B., Maraun, M., Partsch, S., Roscher, C., Schonert, F., Temperton, V.M. Thomisch, K., Weigelt, A., Weisser, W.W., Scheu, S., 2011. Plant diversity surpasses plant functional groups and plant productivity as driver of soil biota in the long term. PLoS ONE 6(1), e16055.

Eldridge, D.J., Val, J., James, A.I., 2011. Abiotic effects predominate under prolonged livestock-induced disturbance. Austral Ecology 36, 367-377,

Ettema, C.H., Wardle, D.A., 2002. Spatial soil ecology. Trends in Ecology and Evolution 17, 177-183.

Eviner, V.T., Chapin III, F.S.C., Vaughn, C.E., 2006. Seasonal variations in plant species effects on soil N and P dynamics. Ecology 87(4), 974-986.

Expotech USA, 2005. A guide to Kjeldahl nitrogen determination methods and apparatus. An industry service publication. LABCONCO. Available at: <http://www.ExpotechUSA.com>. Date accessed: 15 November 2011.

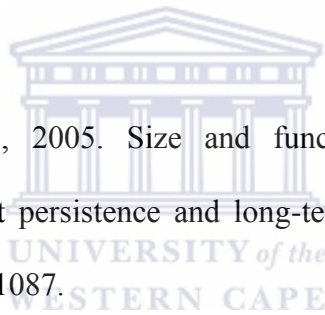
Fernandez, D.P., Neff, J.C., Reynolds, R.L., 2008. Biogeochemical and

ecological impacts of livestock grazing in semi-arid southeastern Utah, USA. *Journal of Arid Environments* 72, 777-791.

Fierer, N., Schimel, J.P., 2003. A proposed mechanism for the pulse in carbon dioxide production commonly observed following the rapid rewetting of a dry soil. *Soil Science Society of America Journal* 67, 798-805.

Fierer, N., Strickland, M. S., Liptzin, D., Bradford, M. A., Cleveland, C. C., 2009. Global patterns in belowground communities. *Ecology Letters* 12, 1238-1249.

Fontaine, S., Barot, S., 2005. Size and functional diversity of microbe populations control plant persistence and long-term soil carbon accumulation. *Ecology Letters* 8, 1075-1087.



FAO, 2011. Food and Agriculture Organization of the United Nations. Biodiversity for Food and Agriculture. Contributing to food security and sustainability in a changing world. Outcomes of an expert workshop held by Food and Agriculture Organization of the United Nations (FAO) and the Platform on Agrobiodiversity Research (PAR) from 14–16 April 2010 in Rome, Italy.

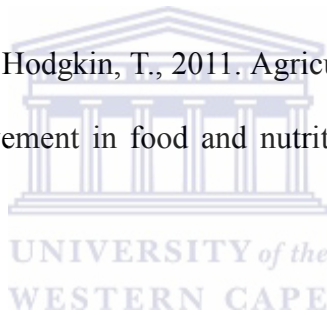
FAO, 2015. Food and Agriculture Organization of the United Nations. Healthy soils are the basis for healthy food production. Available at: www.fao.org/soils-

2015. Date accessed: 27 February 2015.

Frank, D.A., Groffman, P.M., 1998. Ungulate vs. landscape control of soil C and N processes in grasslands of Yellowstone National Park. *Ecology* 79, 2229-2241.

Frey, S.D., Knorr, M., Parrent, J.L., Simpson, R.T., 2004. Chronic nitrogen enrichment affects the structure and function of the soil microbial community in temperate hardwood and pine forest. *Forest Ecology and Management* 196, 159-171.

Frison, E.A., Cherfas, J., Hodgkin, T., 2011. Agricultural biodiversity is essential for a sustainable improvement in food and nutrition security. *Sustainability* 3, 238-253.



Frostegård, A., Bååth E., 1996. The use of phospholipid analysis to estimate bacterial and fungal biomass in soils. *Biology and Fertility of Soils* 22, 59-65.

Frostegård, A., Tunlid, A., Bååth, E., 2010. Use and misuse of PLFA measurements in soils. *Soil Biology and Biochemistry* 43(8), 1621-1625.

Garbeva, P., Van Elsas, J.D., Van Veen, J.A., 2008. Rhizosphere microbial community and its response to plant species and soil history. *Plant and Soil* 302, 19-32.

Garbisu, C., Alkortab, I., Epelde, L., 2011. Assessment of soil quality using microbial properties and attributes of ecological relevance. *Applied Soil Ecology* 49, 1-4.

Garland, J.L., Mills, A.L., 1991. Classification and characterization of heterotrophic microbial communities on the basis of patterns of community-level sole-carbon source utilization. *Applied and Environmental Microbiology* 57, 2351-2359.

Gessner, M.O., Swan, C.M., Dang, C.K., McKie, B.G., Bardgett, R.D., Wall, D.H., Hättenschwiler, S., 2010. Diversity meets decomposition. *Trends in Ecology and Evolution* 25(6), 372-380.

Giller, K.E., Beare, M.H., Lavelle, P., Izac A.-M.N., Swift, M.J., 1997. Agricultural intensification, soil biodiversity and agroecosystem function. *Applied Soil Ecology* 6, 3-16.

Gillson, L., Hoffman, M.T., 2007. Rangeland ecology in a changing world. *Science* 315, 53-54.

Goldblatt, P., Manning, J.C., 2000. Cape plants. A conspectus of the Cape flora of South Africa. *Strelitzia* 9, National Botanical Institute, Pretoria.

Goldblatt, P., Manning, J.C., Snijman, D., 2005. Cape plants: corrections and

additions to the flora. 1. *Bothalia* 35, 35-46.

Golodets, C., Boeken, B., 2006. Moderate sheep grazing in semi-arid shrubland alters small-scale soil surface structure and patch properties. *Catena* 65, 285-291.

Grayston, S.J., Campbell, C.D., Bardgett, R.D., Mawdsley, J.L., Clegg, C.D., Ritz, K., Griffiths, B.S., Rodwell, J.S., Edwards, S.J., Davies, W.J., Elston, D.J., Millard, P., 2004. Assessing shifts in soil microbial community structure across a range of grasslands of differing management intensity using CLPP, PLFA and community DNA techniques. *Applied Soil Ecology* 25, 63-84.

Green, V.S., Stott, D.E., Diack, M., 2006. Assay for fluorescein diacetate hydrolytic activity: optimization for soil samples. *Journal of Soil Biology and Biochemistry* 38, 693-701.

Greiber, T., Moreno, S.P., Åhrén, M., Carrasco, J.N., Kamau, E.C., Jorge Cabrera Medaglia, J.C., Oliva, M.J., Perron-Welch, F., Ali, N., Williams, C., 2012. An Explanatory Guide to the Nagoya Protocol on Access and Benefit-sharing. IUCN, Gland, Switzerland. Available at: https://cmsdata.iucn.org/downloads/an_explanatory_guide_to_the_nagoya_protocol.pdf. Date accessed: 20 October 2014.

Haack, S.K., Garchow, H., Odelson, D.A., Forney, L.J., Klug, M.J., 1994. Accuracy, reproducibility, and interpretation of fatty acid methyl ester profiles of

model bacterial communities. *Applied and Environmental Microbiology* 60, 2483-2493.

Hamilton, E.W., Frank, D.A. 2001. Can plants stimulate soil microbes and their own nutrient supply? Evidence from a grazing tolerant grass. *Ecology* 82, 2397-2402.

Hanson, C.A., Allison, S.D., Bradford, M.A., Wallenstein, M.D., Treseder, K.K., 2008. Fungal Taxa Target Different Carbon Sources in Forest Soil. *Ecosystems* 11, 1157-1167.

Hart, J.F., 2001. Half a century of cropland change. *Geographical Review* 91, 525-543.



Hartmann A., Rothballer M., Schmid, M., 2008. Lorenz Hiltner, a pioneer in rhizosphere microbial ecology and soil bacteriology research. *Plant and Soil* 312, 7-14.

Hartmann, A., Schmid, M., Van Tuinen, D., Berg, G., 2009. Plant-driven selection of microbes. *Plant and Soil* 321, 235-257.

Haygarth P. M., Ritz, K., 2009. The future of soils and land use in the UK: Soil systems for the provision of land-based ecosystem services. *Land Use Policy* 26, 187-197.

Helme, N.A., 2007. Botanical report: Fine scale vegetation mapping of the Bokkeveld Escarpment. Report for CapeNature. Available at: <http://bgis.sanbi.org/fsp/bokkeveldvegetationreport.pdf>. Date accessed: 19 October 2014.

Heneghan, L., Miller, S.P., Baer, S., Callahan Jr., M.A., Montgomery, J., Pavao-Zuckerman, M., Rhoades, C.C., Richardson, S., 2008. Integrating soil ecological knowledge into restoration management. *Restoration Ecology* 16, 608-617.

Herms, D. A., Mattson, W. J., 1992. The dilemma of plants: to grow or defend. *Quarterly Review of Biology* 67, 283-335.

Herrick, J.E., Whitford, W.G., 1995. Assessing the quality of rangeland soils: challenges and opportunities. *Journal of Soil and Water Conservation* 50(3), 237-242.

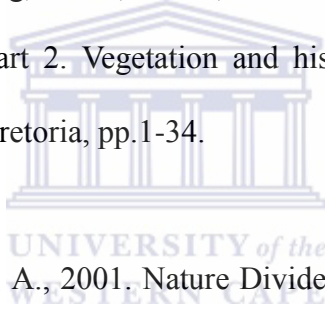
Heywood, V.H., Bates, I., 1995. Introduction, in: Heywood, V.H., Watson, R.T. (Eds.), *Global Biodiversity Assessment*. Cambridge University Press, Cambridge, pp. 1-21.

Hill, G.T., Mitkowski, N.A., Aldrich-Wolfe, L., Emele, L.R., Jurkonie, D.D., Ficke, A., Maldonado-Ramirez, S., Lynch, S.T., Nelson, E.B., 2000. Methods for assessing the composition and diversity of soil microbial communities. *Applied*

Soil Ecology 15, 25-36.

Hochstrasser, T., Millington, J.D.A., Papanastasis, V.P., Parsons, A.P., Paolo, P., Roggero, R.E., Farina, A., Puttock, A., 2014. The Study of Land Degradation in Drylands: State of the Art, in: Mueller, E., Wainwright, J., Parsons, A., Turnbull, L. (Eds.), *Patterns of Land Degradation in Drylands: Understanding Self-Organised Ecogeomorphic Systems*. Springer, pp.13-54.

Hoffman, M. T., Cowling, R. M., 1987. Plant physiognomy, phenology and demography, in: Cowling, R.M., Roux, P.W. (Eds.), *The karoo biome: a preliminary synthesis. Part 2. Vegetation and history*. South African National Scientific programmes, Pretoria, pp.1-34.



Hoffman, M.T., Ashwell, A., 2001. *Nature Divided – land degradation in South Africa*. University of Cape Town Press, Cape Town.

Holechek, J.L., Pieper, R.D., Herbel, C.H., 2004. *Range Management, Principles and Practices*, fifth ed. Prentice Hall, Upper Saddle River, New Jersey.

Hooper, D.U., Bignel, D.E., Brown, V.K., Brussaard, L., Dangerfield, J.M., Wall, D.H., Wardle, D.A., Coleman, D.C., Giller, K.E., Lavelle, P., Van der Putten, W.H., De Rooter, P.C., Rusek, J., Silver, W.L., Tiedje, J.M., Wolters, V., 2000. Interactions between aboveground and belowground biodiversity in terrestrial ecosystems: Patterns, mechanisms, and feedbacks. *BioScience* 50(12), 1049-

1061.

Hooper, D.U., Chapin, F.S., Ewel, J.J., 2005. Effects of biodiversity on ecosystem functioning: a consensus of current knowledge. *Ecological Monographs* 75(1), 3-35.

Huxman, T.E., Snyder, K.A., Tissue, D., Leffler, A.J., Ogle, K., Pockman, W.T., Sandquist, D.R., Potts, D.L., Schwinning, S., 2004. Precipitation pulses and carbon fluxes in semiarid and arid. *Ecosystems*. *Oecologia* 141, 254-268.

ICAFE-MAG, 1989. Manual de Recomendaciones para el cultivo del café. Programa Cooperatives ICAFE-MAG, San José, Costa Rica.

Inderjit, Del Moral, R., 1997. Is separating resource competition and allelopathy from allelopathy realistic? *Botanical Review* 63, 221-230.

Inderjit, Weiner, J., 2001. Plant allelochemical interference or soil chemical ecology? *Perspectives in Plant Ecology, Evolution and Systematics* 4(1), 3-12.

Ingham, E.R., 2007. Soil food web. Available at: http://soils.usda.gov/sqi/concepts/soil_biology/soil_food_web.html. Date accessed: 9 May 2014.

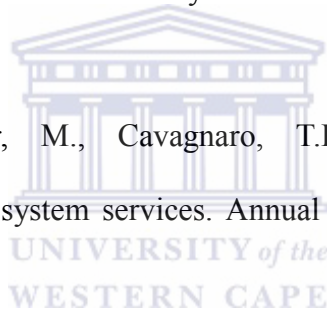
Ingham, R.E., Trofymow, J.A., Ingham, E.R., Coleman, D.C., 1985. Interactions of bacteria, fungi, and their nematode grazers: effects on nutrient cycling and

plant growth. *Ecological Monographs* 55, 119-140.

Jackson, L.E., 2007. Biodiversity in agricultural landscapes: Investing without losing interest. *Agriculture, Ecosystems and Environment* 121, 193-195.

Jackson, L., Bawa, K., Pascual, U., Perrings, C., 2005. agroBIODIVERSITY: A new science agenda for biodiversity support of sustainable agroecosystems. DIVERSITAS Report number 4. Available at: <http://www.agrobiodiversity-diversitas.org/documents/Jackson%20et%20al%20Science%20plan%20agroBIO%20DIVERSITY.pdf>. Date accessed: 23 May 2013.

Jackson, L.E., Burger, M., Cavagnaro, T.R., 2008. Roots, nitrogen transformations, and ecosystem services. *Annual Review of Plant Biology* 59, 341-363.



Jackson, L.E., Pulleman, M.M., Brussaard, L., Bawa, K.S., Brown, G.G., Cardoso, I.M., de Ruiter, P.C., García-Barrios, L., Hollander, A.D., Lavelle, P., Ouédraogo, E., Pascual, U., Setty, S., Smukler, S.M., Tschardtke, T., Van Noordwijk, M., 2012. Social-ecological and regional adaptation of agrobiodiversity management across a global set of research regions. *Global Environmental Change* 22, 623-639.

Jürgens, N., 1997. Floristic biodiversity and history of African arid regions. *Biodiversity and Conservation* 6, 495-514.

Kaljonen, M., 2006. Co-construction of agency and environmental management. The case of agri-environmental policy implementation at Finnish farms. *Journal of Rural Studies* 22(2), 205-216.

Kang, S., Post, W.M., Nichols, J.A., Wang, D., West, T.O., Bandaru, V., Izaurrealde, R.C., 2013. Marginal Lands: Concept, Assessment and Management. *Journal of Agricultural Science* 5, 129-139.

Karlen, D.L., Andrews, S.S., Weinhold, B.J., Doran, J.W., 2003. Soil quality: humankind's foundation for survival. *Journal of Soil and Water Conservation* 58, 171-179.



Kemper, J., Cowling, R.M., Richardson, D.M., 1999. Fragmentation of South African renosterveld shrublands: effects on plant community structure and conservation implications. *Biological Conservation* 90, 103-111.

Kirk, J.L., Beaudette, L.A., Hart, M., Moutoglis, P., Klironomos, J.N., Lee, H., Trevors, J.T., 2004. Methods of studying soil microbial diversity. *Journal of Microbiological Methods* 58, 169-188.

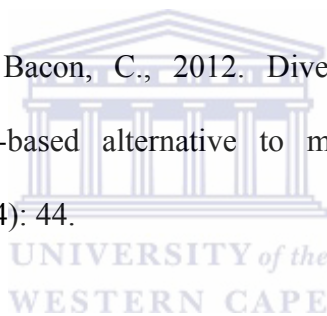
Klironomos, J.N., 2002. Feedback to the soil community contributes to plant rarity and invasiveness in communities. *Nature* 417, 67-70.

Koohafkan, P., Stewart, B.A., 2008. Water and Cereals in Drylands. Food and Agriculture Organisation of the United Nations (FAO). Earthscan, London.

Körner, C.H. 2000 Biosphere responses to CO₂-enrichment. *Ecological Applications* 10, 1590-1619.

Kraaij, T., Milton, S. J., 2006. Vegetation changes (1995-2004) in semi-arid Karoo shrubland, South Africa: Effects of rainfall, wild herbivores and change in land use. *Journal of Arid Environments* 64(1), 174-192.

Kremen, C., Iles, A., Bacon, C., 2012. Diversified farming systems: an agroecological, systems-based alternative to modern industrial agriculture. *Ecology and Society* 17(4): 44.



Krug, C.B., 2004. Practical Guidelines for the Restoration of Renosterveld. University of Stellenbosch. Available at: <http://academic.sun.ac.za/consecol/RenosterveldRestorationProject/index.htm>.
Date accessed: 20 June 2013.

Kruger, F.J., 1984. Patterns of vegetation and climate in the mediterranean zone of South Africa. *Bulletin de la Société Botanique de France* 131, 213-224.

Lambers, H., Chapin III, F.S., Pons, T.L., 1998. Plant physiological ecology. Springer, Berlin.

Lavelle, P., 2012. Soil as a Habitat, in: Wall, D.H., Bardgett, R.D., Behan-Pelletier, V., Herrick, J.E., Hefin Jones, T., Ritz, K., Six, J., Strong, D.R., Van der Putten, W.H. (Eds.), *Soil Ecology and Ecosystem Services*. Oxford University Press. Oxford, pp. 7-27.

Lavelle, P., Decaëns, T., Aubert, M., Barot, S., Blouin, M., Bureau, F., Margerie, P., Mora, P., Rossi, J-P., 2006. Soil invertebrates and ecosystem services. *European Journal of Soil Biology* 42, S3-S15.

Lavelle, P., Spain, A., 2001. *Soil Ecology*. Springer Science and Business Media.

Lemons, J., Victor, R., Schaffer, D., 2003. *Conserving Biodiversity in Arid Regions: Best Practices in Developing Nations*. Springer Science and Business Media.

Li, J., Okin, G.S., Epstein, H.E., 2009. Effects of enhanced wind erosion on surface soil texture and characteristics of windblown sediments. *Journal of Geophysical Research: Biogeosciences*, 114 (G2).

Likens, G.E., Bormann, F.H., Pierce, R.S., Eaton, J.S., Johnson, N.M., 1977. *Biogeochemistry of forested ecosystems*. Springer, New York.

Low, A.B., Rebelo, A.G., 1996. *Vegetation of South Africa, Lesotho and*

Swaziland. A companion to the vegetation map of South Africa, Lesotho and Swaziland. Department of Environmental Affairs and Tourism, Pretoria.

Lyford, M.E., Jackson, S.T., Betancourt, J.L., Gray, S.T., 2003. Influence of landscape structure and climate variability on a late Holocene plant migration. *Ecological Monographs* 73, 567-583.

Maczko, K., Tanaka, J. A., Breckenridge, R., Hiding, L., Heintz, H. T. Fox, W. E. Kreuter, U. P., Duke, C. S., Mitchell, J. E., McCollum, D.W., 2011. Rangeland ecosystem goods and services: values and evaluation of opportunities for ranchers and land managers. *Rangelands* 33(5), 30-36.

Madsen, E. L., 2008. Microbial biogeochemistry: A grand synthesis, in: *Environmental Microbiology: From Genomes to Biogeochemistry*. Blackwell Publishing, Malden, pp. 281-299.

Maestre, F.T., Quero, J.L., Gotelli, N.J., Escudero, A., Ochoa, V., Delgado-Baquerizo, M., García-Gómez, M., Bowker, M.A., Soliveres, S., Escolar, C., García-Palacios, P., Berdugo, M., Valencia, E., Gozalo, B., Gallardo, A., Aguilera, L., Arredondo, T., Blones, J., Boeken, B., Bran, D., Conceição, A.A., Cabrera, O., Chaieb, M., Derak, M., Eldridge, D.J., Espinosa, C.I., Florentino, A., Gaitán, J., Gatica, M.G., Ghiloufi, W., Gómez-González, S., Gutiérrez, J.R., Hernández, R.M., Huang, X., Huber-Sannwald, E., Jankju, M., Miriti, M., Monerri, J., Mau, R.L., Morici, E., Naseri, K., Ospina, A., Polo, V., Prina, A.,

Pucheta, E., Ramírez-Collantes, D.A., Romão, R., Tighe, M., Torres-Díaz, C., Val, J., Veiga, J.P., Wang, D., Zaady, E., 2012. Plant species richness and ecosystem multifunctionality in global drylands. *Science* 335 (6065), 214-218.

Manning, J., Goldblatt, P., 1997. Nieuwoudtville, Bokkeveld Plateau and Hantam. Botanical Society of South Africa, Cape Town.

McDowell, C., 1994. Grazing and renosterveld management, in: Low, A.B., Jones, F.E. (Eds.), Symposium on the sustainable use and management of renosterveld remnants in the Cape Floristic Region, FCC Report 95/4. Botanical Society of South Africa, Cape Town. pp. 63–71.

McDowell, C., 1995. Grazing and renosterveld management, in: Low, AB., Jones, F.E. (Eds.), The sustainable use and management of renosterveld remnants in the Cape Floristic Region. FCC Report 1995/4. Botanical Society of South Africa, Cape Town, pp. 63-80.

McKeon, G.M., Stone, G.S., Syktus, J.I., Carter, J.O., Flood, N.R., Ahrens, D.G., Bruget, D.N., Chilcott, C.R., Cobon, D.H., Cowley, R.A., Crimp, S.J., Fraser, G.W., Howden, S.M., Johnston, P.W., Ryan, J.G., Stokes, C.J., Day, K.A., 2009. Climate change impacts on northern Australian rangeland livestock carrying capacity: a review of issues. *The Rangeland Journal* 31, 1-29.

McNear Jr., D. H., 2013. The Rhizosphere - Roots, Soil and Everything In

Between. *Nature Education Knowledge* 4(3):1. Available at: <http://www.nature.com/scitable/knowledge/library/the-rhizosphere-roots-soil-and-67500617>. Date accessed: 20 January 2014.

Meadows, M. E., Watkeys, M. K., 1999. Palaeoenvironments, in: Dean, W. R. J., Milton, S.J. (Eds.), *The Karoo: Ecological Patterns and Processes*. Cambridge University Press, United Kingdom, pp. 27-41.

Mele, P.M., Crowley, D.E., 2008. Application of self-organizing maps for assessing soil biological quality. *Agriculture, Ecosystems and Environment* 126, 139-152.

Microbial Insights, 2009. PLFA overview. Available at: <http://www.microbe.com/wp-content/uploads/2015/01/plfa-mic.pdf>. Date accessed: 20 April 2013.

Midgley, G.F., Bond, W.J., Kapos, V., Ravilious, C., Scharlemann, J.P.W., Woodward, F.I., 2010. Terrestrial carbon stocks and biodiversity: key knowledge gaps and some policy implications. *Current Opinion in Environmental Sustainability* 2, 264-270.

Mijangos, I., Pérez, R., Albizu, I., Garbisu, C., 2006. Effects of fertilization and tillage on soil biological parameters. *Enzyme and Microbial Technology* 40, 100-106.

Milchunas, D.G., Lauenroth, W.K., 1993. Quantitative effects of grazing on vegetation and soils over a global range of environments. *Ecological Monographs* 63, 327-366.

MEA, 2005. Millennium Ecosystem Assessment. *Ecosystems and Human Well-being: Biodiversity Synthesis*. World Resources Institute, Washington, DC.

Mills, A.J., Birch, S.C., Stephenson, J.D., Bailey, R.V., 2012. Carbon stocks in fynbos, pastures and vineyards on the Agulhus Plain, South Africa: a preliminary assessment. *South African Journal of Plant and Soil*, 29 (3-4), 191-193.



Milton, K., 1997. Nature, culture and biodiversity, in: Arler, F., Svennevig, I. (Eds.), *Cross-Cultural Protection of Nature and the Environment*. Odense University Press, Odense, pp. 71-83.

Milton, S.J., 2004. Grasses as invasive alien plants in South Africa. *South African Journal of Science* 100, 69-75.

Milton, S.J., 2007. Rapid Assessment Method for Renosterveld. Renosterveld Assessment Workshop, unpublished report.

Milton, S.J., Dean, W.R.J., 1990. Seed production in rangelands of the southern

Karoo. South African Journal of Science 86, 231-233.

Milton, S.J., Dean, W.R.J., Du Plessis, M. A., Siegfried, W.R., 1994. A conceptual model of arid rangeland degradation. The escalating cost of declining productivity. Bioscience 44, 70-76.

Mittermeier, R.A., Gil, P.R., Hoffmann, M., Pilgrim, J.D., Brooks, T.M., Mittermeier, C.G., Lamoreux J.F., Da Fonseca, G.A.B., 2004. Hotspots revisited: earth's biologically richest and most endangered terrestrial ecoregions. Cemex, Mexico City.

Moll, E.J., Campbell, B.M., Cowling, R.M., Bossi, L., Jarman, M.L., Boucher, C., 1984. A description of major vegetation categories in and adjacent to the Fynbos Biome. CSIR, Pretoria, pp. 12-14.

Moussa, A.S., Van Rensburg, L., Kellner, K., Bationo, A., 2009. Soil microbial biomass in semi-arid-communal sandy rangelands in the Western Bophirima district, South Africa. Applied ecology and environmental research 5(1), 43-56.

Mucina, L., Rutherford, M.C., (Eds.), 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19, South African National Biodiversity Institute, Pretoria.

Muhl, S.A., 2008. Alien grass invasion of Renosterveld: Influence of soil

variable gradients. MSc thesis, University of Stellenbosch.

Musil, C.F. Milton, S.J. Davis, G.W., 2005. The threat of alien invasive grasses to lowland Cape floral diversity: an empirical appraisal of the effectiveness of practical control strategies. *South African Journal of Science* 101, 337-343.

Muyzer, G.E., De Waal, C., Uitterlinden, A., 1993. Profiling of complex microbial populations by denaturing gradient gel electrophoresis of polymerase chain reaction-amplified genes encoding for 16 S rRNA. *Applied Environmental Microbiology* 59, 695-700.

Mworia, J.K., Mnene, W.N., Musembi, D.K., Reid, R.S., 1997. Resilience of soils and vegetation subjected to different grazing intensities in a semi-arid rangeland of Kenya. *African Journal of Range and Forage Science* 14, 26-31.

Myers, N., Mittermeier, R.A., Mittermeier, C.G., Da Fonseca, G.A.B., Kent, J., 2000. Biodiversity hotspots for conservation priorities. *Nature* 403(6772), 853-858.

Naeth, M.A., Bailey, A.W., Pluth, D.J., Chanasyk, D.S., Hardin, R.T., 1991. Grazing impacts on litter and soil organic matter in mixed prairie and fescue grassland ecosystems of Alberta. *Journal of range management* 44(1), 7-12.

Neff, J.C., Reynolds, R.L., Belnap, J. Lamothe, P., 2005. Multi-decadal impacts

of grazing on soil physical and biogeochemical properties in southeast Utah. *Ecological Applications* 15, 87-95.

Nelson, M., Dudal, R., Gregersen, H., Jodha, N., Nyamia, D., Groenwald, J.-P., Torres, F., Kassam, A., 1997. Report of the studies of CGIAR research priorities for marginal lands. Technical Advisory Committee, Consultative Group on International Research and FAO, Rome.

Nguyen, C., 2003. Rhizodeposition of organic C by plants: mechanisms and controls. *Agronomie* 23, 375-396.

Northup, B.K., Brown, J.R., Ash, A.J., 2005. Grazing impacts on spatial distribution of soil and herbaceous characteristics in an Australian tropical woodland. *Agroforestry Systems* 65, 137-150.

Noss, R.F., 1996. Ecosystems as conservation targets. *Trends in Ecology and Evolution* 11, 351.

Noy-Meir, J., 1985. Desert Ecosystem structure and function, in: Evenari, M., Noy-Meir, I., Goodall, D.W. (Eds.), *Hot deserts and arid shrublands*. Elsevier Scientific Publishers, Amsterdam, pp. 93-103.

Nunes, P.A.D, Van der Bergh, J.C.J.M., 2001. Economic valuation of biodiversity: sense or nonsense? *Ecological Economics* 39, 203-222.

O'Farrell P.J., De Lange, W.J, Le Maitre, D.C, Reyers B., Blignaut J.N, Milton S.J., Atkinson D., Egoh B., Maherry A., Colvin C., Cowling, R.M., 2011. The possibilities and pitfalls presented by a pragmatic approach to ecosystem service valuation in an arid biodiversity hotspot. *Journal of Arid Environments* 75, 612-623.

O'Farrell, P.J., Donaldson, J.S., Hoffman, M.T., 2007. The influence of ecosystem goods and services on livestock management practices on the Bokkeveld plateau, South Africa. *Agriculture, Ecosystems and Environment* 122, 312-324.

O'Farrell, P.J., Donaldson, J.S., Hoffman, M.T., 2009. Local benefits of retaining natural vegetation for soil retention and hydrological services. *South African Journal of Botany* 75, 573-583.

O'Farrell, P.J., Donaldson, J.S., Hoffman, M.T., 2010. Vegetation transformation, functional compensation, and soil health in a semi-arid environment. *Arid Land Research and Management* 24(1), 12-30.

Pallarès Vinyoles, G., 2008. Effects of land use on soil microbial community function in western Kenya highlands. MSc thesis, Swedish University of Agricultural Sciences.

Pankhurst, C.E., Ophel-Keller, K., Doube, B.M., Gupta, V.V.S.R., 1996. Biodiversity of soil microbial communities in agricultural systems. *Biodiversity and Conservation* 5, 197-209.

Paterson-Jones, C., 1998. Renosterveld's Floral Treasure: Headed for extinction. *Africa- Environment and Wildlife* 6, 27-32.

Pence, G.Q.K., 2008. C.A.P.E. Fine-Scale Systematic Conservation Planning Assessment: Technical Report. CapeNature, Cape Town.

Perfecto, I., Vandermeer, J., 2002. Quality of agroecological matrix in a tropical montane landscape: Ants in coffee plantations in southern Mexico. *Conservation Biology* 16(1), 174-182.



Perfecto, I., Vandermeer, J., Hanson, P., Cartín, V., 1997. Arthropod biodiversity loss and the transformation of a tropical agro-ecosystem. *Biodiversity and Conservation* 6, 935-945.

Peters, D.P.C, Bestelmeyer, B.T., Herrick, J.E., Fredrickson, E.L., Monger, H.C., Havstad, K.M., 2006. Disentangling complex landscapes: New insights into arid and semiarid system dynamics. *BioScience* 56(6), 491-501.

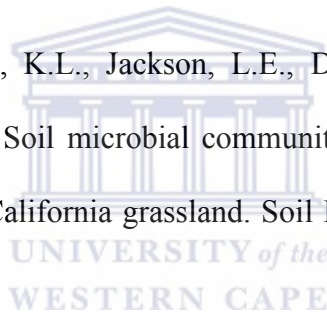
Piñeiro, G., Paruelo, J.M., Oesterheld, M., Jobbágy, E.G., 2010. Pathways of grazing effects on soil organic carbon and nitrogen. *Rangeland Ecology and*

Management 63, 109-119.

Ponge, J.F., 2003. Humus forms in terrestrial ecosystems: a framework to biodiversity. *Soil Biology and Biochemistry* 35, 935-945.

Porazinska, D.L., Bardgett, R.D., Blaauw, M.B. Hunt, H.W., Parsons, A.N., Seastedt, T.R., Wall, D.H., 2003. Relationships at the aboveground-belowground interface: Plants, soil biota and soil processes. *Ecological Monographs* 73(3), 377-395.

Pothoff, M., Steenwerth, K.L., Jackson, L.E., Drenovsky, R.E., Scow, K.A., Joergensen, R.G., 2006. Soil microbial community composition as affected by restoration practices in California grassland. *Soil Biology and Biochemistry* 38, 1851-1860.



Price, W.P., 1988. An overview of organismal interactions in ecosystems in evolutionary and ecological time. *Agriculture, Ecosystems and Environment* 2, 369-377.

Pringle, H., Tinley, K.L., 2003. Are we overlooking critical geomorphic determinants of landscape change in Australian rangelands? *Ecological Management and Restoration* 4, 180–186.

Procheş, S., Cowling, R.M., Goldblatt, P., Manning, J.C., Snijman, D.A., 2006.

An overview of the Cape geophytes. *Biological Journal of the Linnean Society* 87, 27-43.

Provenza, F., Pringle, H., Revell, D., Bray, N., Hines, C., Teague, R., Steffens, T., Barnes, M., 2013. Complex Creative Systems. Principals, processes, and practices of transformation. *Rangelands* 35(5), 6-13.

Provenza, F., Pringle, H., Revell, D., Bray, N., Hines, C., Teague, R., Steffens, T., Barnes, M., 2013. Complex creative systems. Principals, processes, and practices of transformation. *Rangelands* 35(5), 6–13.

Radloff, F.G.T., Mucina, L., Snyman, D., 2014. The impact of native large herbivores and fire on the vegetation dynamics in the Cape renosterveld shrublands of South Africa: insights from a six-year field experiment. *Applied Vegetation Science* 17(3), 456-469.

Ramsey, P.W., Rillig, M.C., Feris, K.P., Holben, W.E., Gannon, J.E., 2006. Choice of methods for soil microbial community analysis: PLFA maximizes power compared to CLPP and PCR-based approaches. *Pedobiologia* 50, 275-280.

Ravi, S., D'Odorico, P., Wang, L., White, C., Okin, G., Macko, S., Collins, S., 2009. Post-fire resource redistribution in desert grasslands: a possible negative feedback on land degradation. *Ecosystems* 12, 434-444.

Rebello, A.G., 1996. South and South-west Coast Renosterveld, in: Low, A.B., Rebello, A.G. (Eds.), *Vegetation of South Africa, Lesotho and Swaziland*. Department of Environmental Affairs and Tourism, Pretoria, p 67.

Rebello, A.G., 1997. Conservation, in: Cowling, R.M., Richardson, D.M., Pierce, S.M. (Eds), *Vegetation of Southern Africa*. Cambridge University Press, Cambridge, pp. 571-590.

Rebello, A.G., Boucher, C., Helme, N., Mucina, L., Rutherford, M.C., Smit, W.J., Powrie, L.W., Ellis, F., Lambrechts, J.J., Scott, L., 2006. Fynbos biome, in: Mucina, L., Rutherford, M.C. (Eds), *The Vegetation of South Africa, Lesotho and Swaziland*. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria, pp. 53-219.

Reiss, J., Bridle, J.R., Montoya, J.M., Woodward, G., 2009. Emerging horizons in biodiversity and ecosystem functioning research. *Trends in Ecology and Evolution* 24, 505-514.

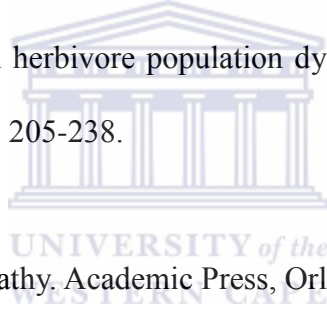
Reynolds, H.L., Packer, A., Bever, J.D., Clay, K., 2003. Grassroots ecology: plant-microbe-soil interactions as drivers of plant community structure and dynamics. *Ecology* 84, 2281-2291.

Reynolds, J.F., Stafford Smith, D.M., 2001. Do humans cause deserts?, in:

Reynolds, J.F., Stafford Smith, D.M., (Eds.), Global desertification: do humans cause deserts? Dahlem University Press, Berlin, pp. 1-22.

Reynolds, J.F., Stafford Smith, D.M., Lambin, E.F., Turner II, B.L., Mortimore, M., Batterbury, S.P.J., Downing, T.E., Dowlatabadi, H., Fernández, R.J., Herrick, J.E., Huber-Sannwald, E., Jiang, H., Leemans, R., Lynam, T., Maestre, F.T., Ayarza, M., Walker, B., 2007. Global desertification: building a science for dryland development. *Science* 316, 847-851.

Rhoades, D.F., 1985. Offensive-defensive interactions between herbivores and plants: their relevance in herbivore population dynamics and ecological theory. *American Naturalist* 125, 205-238.



Rice, E.L., 1984. Allelopathy. Academic Press, Orlando.

Richardson, F.D., Hahn, B.D., Hoffman, M.T., 2005. On the dynamics of grazing systems in the semi-arid succulent Karoo: the relevance of equilibrium and nonequilibrium concepts to the sustainability of semi-arid pastoral systems. *Ecological Modelling* 187, 491-512.

Rietkerk, M., Ketner, P., Burger, J., Hoorens, B., Olf, H., 2000. Multiscale soil and vegetation patchiness along a gradient of herbivore impact in a semi-arid grazing system in West Africa. *Plant Ecology* 148, 207-224.

Riginos, C., Hoffman, M.T., 2003. Changes in population biology of two succulent shrubs along a grazing gradient. *Journal of Applied Ecology* 40, 615-625.

Ritz, K., Van der Putten, W.H., 2012. The living soil and ecosystem services, in: Wall, D.H., Bardgett, R.D., Behan-Pelletier, V., Herrick, J.E., Hefin Jones, T., Ritz, K., Six, J., Strong, D.R., Van der Putten, W.H. (Eds.), *Soil Ecology and Ecosystem Services*. Oxford University Press. Oxford, pp. 5-6.

Rouget, M., Jonas, Z., Cowling, R.M., Desmet, P.G., Mohamed, B., Mucina, L., Rutherford, M.C., Powrie, L.W., 2006. Ecosystem status and protection levels of vegetation types, in: Mucina, L., Rutherford, M.C. (Eds.), 2006. *The Vegetation of South Africa, Lesotho and Swaziland*. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

Roux, P.W., Vorster, M., 1983. Vegetation changes in the Karoo. *Proceedings of the Grassland Society of Southern Africa* 18, 25-29.

Rowe, H.L., Brown, C.S., Paschke, M.W., 2009. The influence of soil inoculums and nitrogen availability on restoration of high-elevation steppe communities invaded by *Bromus tectorum*. *Restoration Ecology* 17, 686-694.

Saetre, P., Bååth, E., 2000. Spatial variation and patterns of soil microbial community structure in a mixed spruce-birch stand. *Soil Biology and*

Biochemistry 32, 909-917.

Samuels, M.I., 2006. Patterns of resource use by livestock during and after drought in a communal rangeland in Namaqualand. MSc Thesis, University of the Western Cape.

SANBI, 2006. South African National Biodiversity Institute. Vegetation map of Lesotho, Swaziland and South Africa. Available at: <http://bgis.sanbi.org/vegmap/biomes.asp>. Date accessed: 13 October 2014.

SANBI and DEAT, 2009. South African National Biodiversity Institute and Department of Environmental Affairs and Tourism. Threatened Ecosystems in South Africa: Descriptions and Maps. Draft for Comment. South African National Biodiversity Institute, Pretoria, South Africa. Gazetted: Threatened Ecosystems National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection.

Sankaran, M., Augustine, D.J., 2004. Large herbivores suppress decomposer abundance in a semiarid grazing ecosystem. *Ecology* 85, 1052-1061.

Sayre, N.F. 2001. The new ranch handbook: a guide to restoring western rangelands. Quivira Coalition, Santa Fe.

Schadt, C.W., Martin, A.P., Lipson, D.A., Schmidt, S.K., 2003. Seasonal

dynamics of previously unknown fungal lineages in tundra soils. *Science* 301, 1359-1361.

Scherr, S.S., McNeely, J.A., 2008. Biodiversity conservation and agricultural sustainability: Towards a new paradigm of 'ecoagriculture' landscapes. *Philosophical Transactions of the Royal Society* 363, 477-494.

Scheu, S., Schulz, E., 1996. Secondary succession, soil formation and development of a diverse community of oribatids and saprophagous soil macro-invertebrates. *Biodiversity and Conservation* 5(2), 235-250.

Schimel, J.P. Bennet, J., Frierer, N., 2005. Microbial community composition and soil nitrogen cycling: is there really a connection?, in: Bardgett, R.D., Usher, M.B., Hopkins, D.W. (Eds.), *Biological Diversity and Function in Soil*. Cambridge University Press, Cambridge.

Schlesinger, W. H., Jones, C. S., 1984. The comparative importance of overland runoff and mean annual rainfall to shrub communities of the Mojave Desert. *Botanical Gazette* 145, 116-124.

Schlesinger, W.H., Pilmanis, A.M., 1998. Plant-soil interactions in deserts. *Biogeochemistry* 42, 169-187.

Schmalz, H., 2011. Soil spatial heterogeneity and measured soil responses:

factors in an ecological grazing experiment on a bunchgrass prairie. Thesis, University of Idaho.

Schmalz, H.J., Taylor, R.V., Johnson, T.N., Kennedy, P.L., DeBano, S.J., Newingham, B.A., McDaniel, P.A., 2013. Soil morphologic properties and cattle stocking rate affect dynamic soil properties. *Rangeland Ecology and Management* 66(4), 445-453.

Schroers, J. O., 2006. Towards the development of marginal land use depending on the framework of agricultural market, policy and production techniques. University of Giessen, Germany.

Schwinning, S., Sala, O.E., 2004. Hierarchy of responses to resource pulses in arid and semi-arid ecosystems. *Oecologia* 141(2), 211-220.

Scoones, I., 1995. New directions in pastoral development in Africa, in: Scoones, I., *Living with uncertainty: new directions in pastoral development in Africa*. Intermediate Technology Publications, London, pp. 1-36.

Seymour, C.L., Dean, W.R.J., 1999. Effects of heavy grazing on invertebrate assemblages in the succulent karoo, South Africa. *Journal of Arid Environments* 43, 267-286.

Sharma, G.P., Muhl, S.A., Esler, K.J., Milton, S.J., 2010. Competitive

interactions between the alien invasive annual grass *Avena fatua* and indigenous herbaceous plants in South African Renosterveld: the role of nitrogen enrichment. *Biological Invasions* 12, 3371-3378.

Sharma, S., Rangger, A., Von Lutzow, M., Insam, H., 1998. Functional diversity of soil bacterial communities increases after maize litter amendment. *European Journal of Soil Biology* 34, 53-60.

Siepel, H., Van de Bund, C. F., 1988. The influence of management practises on the microarthropod community of grassland. *Pedobiologica* 31, 179-185.

Smet, M., Ward, D., 2006. Soil quality gradients around water-points under different management systems in a semi-arid savannah, South Africa. *Journal of Arid Environments* 64, 251-269.

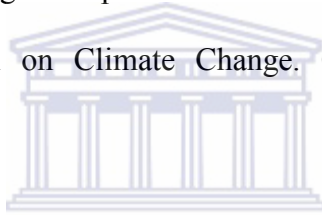
Smith, J.G., Eldridge, D.J., Throop, H.L., 2012. , Landform and vegetation patch type moderate the effects of grazing-induced disturbance on carbon and nitrogen pools in a semi-arid woodland. *Plant and Soil* 360(1-2), 405-419.

Smith, P., Powlson, D.S., 2003. Sustainability of soil management practices - a global perspective, in: Abbott, L.K., Murphy, D.V. (Eds.), *Soil biological fertility - a key to sustainable land use in agriculture*. Kluwer Academic Publishers, Amsterdam.

Snijman, D., Perry, P., 1987. A floristic analysis of the Nieuwoudtville wild flower reserve, Northwestern Cape. *South African Journal of Botany* 53(6), 445-454.

Soini, K., Aakkula, J., 2007. Framing the biodiversity of agricultural landscapes: The essence of local conceptions and constructions. *Land Use Policy* 24, 311-321.

Solomon, S., (Ed.), 2007. *Climate Change: The physical science basis. Contribution of Working Group I to the fourth assessment report of the Intergovernmental Panel on Climate Change.* Cambridge University Press, Cambridge.



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WESTERN CAPE

Specht, R.L. (Ed.), 1979. *Heathlands and related shrublands. Ecosystems of the World. Vol. 9A. Descriptive Studies.* Elsevier, Amsterdam.

Stafford Smith, M., 2008. Foreword, in: Galvin, K.A., Reid, R.S., Behnke, R.H. Jr, Hobbs, N.T. (Eds.), *Fragmentation in semi-arid and arid landscapes.* Springer, Dordrecht, pp. ix-x.

Stavi, I., Ungar, E.D., Lavee, H., Sarah, P., 2008. Grazing-induced spatial variability of soil bulk density and content of moisture, organic carbon and calcium carbonate in a semi-arid rangeland. *Catena* 75, 288-296.

Steenwerth, K.L., Jackson, L.E., Calderón, F.J., Stromberg, M.R., Scow, K.M., 2002. Soil microbial community composition and land use history in cultivated and grassland ecosystems of coastal California. *Soil Biology and Biochemistry* 34, 1599-1611.

Stefanowicz, A., 2006. The Biolog plates technique as a tool in ecological studies of microbial communities. *Polish Journal of Environmental Studies* 15(5), 669.

Steinberger, Y., Freckman, D.W., Parker, L.W., Whitford, W.G., 1984. Effects of simulated rainfall and litter quantities on desert soil biota; nematodes and microarthropods. *Pedobiologia* 26, 267-274.

Swift, M.J., Anderson, J.M., 1993. Biodiversity and ecosystem function in agricultural systems, in: Schulze, E.D., Mooney, H. (Eds.), *Biodiversity and Ecosystem function*. Springer, Berlin, pp. 15-41.

Swift, M.J., Heal, O.W., Anderson, J.M., 1979. *Decomposition in terrestrial ecosystems*. University of California Press, Berkeley.

Swift, M.J., Izac, A.-M.N., Van Noordwijk, M., 2004. Biodiversity and ecosystem services in agricultural landscapes - are we asking the right questions? *Agriculture, Ecosystems and Environment* 104, 113-134.

Swift, M.J., Vandermeer, J., Ramakrishnan, P.S., Anderson, J.M., Ong, C.K., Hawkins, B.A., 1996. Chapter 11: Biodiversity and Agroecosystem function, in: Mooney, H.A., Chushman, J.H., Medina, E., Sala, O.E., Schulze, E.-D. (Eds.), *Functional Roles of Biodiversity: A Global Perspective*. John Wiley and Sons, New York, pp. 261-298.

Sylvain, Z.A., Wall, D.H., 2011. Linking soil biodiversity and vegetation: Implications for a changing planet. *American Journal of Botany* 98(3), 517-527.

Tainton, N.M., 1999. *Veld management in South Africa*. University of Natal Press. Pietermaritzburg.

Takhtajan, A., 1986. *Floristic regions of the world*. University of California Press, Berkeley.

Tate, R.L., 2000. *Soil microbiology*, second ed. John Wiley and Sons, New York.

Taylor, H.C., 1978. Capensis, in: Werger, M.J.A. (Ed.), *Biogeography and ecology of southern Africa*. Dr. W. Junk, The Hague, pp. 171-229.

Teague, W.R., Dowhower, S.L., Baker, S.A., Haile, N., DeLaune, P.B., Conover, D.M., 2011. Grazing management impacts on vegetation, soil biota and soil chemical, physical and hydrological properties in tall grass prairie. *Agriculture, Ecosystems and Environment* 141, 310-322.



Teague, W.R., Kreuter, U.P., Grant, W.E., Díaz-Solis, H., Kothmann, M.M., 2009. Economic implications of maintaining rangeland ecosystem health in a semiarid savanna. *Ecological Economics* 68, 1417-1429.

Thring, T.S.A., Weitz, F.M., 2006. Medicinal plant use in the Bredasdorp/Elim region of the Southern Overberg in the Western Cape Province of South Africa. *Journal of Ethnopharmacology* 103, 261-275.

Throop, H.L., Archer, S.R., 2008. Shrub (*Prosopis velutina*) encroachment in a semi-desert grassland: spatial-temporal changes in soil organic carbon and nitrogen pools. *Global Change Biology* 14, 2420-2431.

Tilman, D., Cassman, K.G., Matson, P.A., Naylor, R., Polasky, S., 2002. Agricultural sustainability and intensive production practices. *Nature* 418, 671-677.

Todd, S. W., 1999. Patterns of seed production and shrub association in two palatable Karoo shrub species under contrasting land use intensities. *African Journal of Range and Forage Science*, 17, 22-26.

Todd, S.W., 2008a. Options for Invasive Grass Management in the Nieuwoudtville Wildflower Reserve. *Indigo Development and Change*, Nieuwoudtville.

Todd, S.W., 2008b. Final report on the results and analysis of the Wild Oats control experiment in the Nieuwoudtville Wildflower Reserve. Indigo Development and Change, Nieuwoudtville.

Todd, S.W., 2010. Vegetation and Plant Communities Associated with the Tillite and Dolerite Renosterveld Types of the Avontuur Conservation Area, Nieuwoudtville, South Africa. A Drynet Science and Technology Expertise.

Todd, S.W., Hoffman, M.T., 2009. A fence-line in time demonstrates grazing-induced vegetation shifts and dynamics in the semiarid Succulent Karoo. *Ecological Applications* 19(7), 1897-1908.

Torsvik, V., Øvreås, L., 2002. Microbial diversity and function in soil: from genes to ecosystems. *Current Opinion in Microbiology* 5, 240-245.

Treseder, K.K., 2004. A meta-analysis of mycorrhizal responses to nitrogen, phosphorus, and atmospheric CO₂ in field studies. *New Phytologist* 164, 347-355.

Tscharntke, T., Clough, Y., Wanger, T.C., Jackson, L., Motzke, I., Perfecto, I., Vandermeer, J., Whitbread, A., 2012. Global food security, biodiversity conservation and the future of agricultural intensification. *Biological Conservation* 151, 53-59. Doi:10.1016/j.biocon.2012.01.068

Underwood, E.J., 1981. The mineral nutrition of livestock. Commonwealth Agricultural Bureaux, Slough.

UNCCD, 2010. United Nations Convention to Combat Desertification. Drylands Soil Brochure. United Nations Environment Programme, Geneva. Available at: <http://www.unccd.int/Lists/SiteDocumentLibrary/Publications/DrylandsSoilUNCCDBrochureFinal.pdf>. Date accessed: 12 February 2013.

UNCCD, 2011. United Nations Convention to Combat Desertification. Factsheet number 5. United Nations Environment Programme, Geneva. Available at: <http://www.unccd.int/publicinfo/factsheets/pdf/factsheets-eng.pdf>. Date accessed: 10 October 2011.



UNEMG, 2011. United Nations Environment Management Group. Global Drylands: A UN system-wide response. Available at: http://www.unccd.int/Lists/SiteDocumentLibrary/Publications/Global_Drylands_Full_Report.pdf. Date accessed: 16 October 2014.

Van Bruggen, A. H. C., Semenov, A. M., 2000. In search of biological indicators for soil health and disease suppression. *Applied Soil Ecology* 15, 13-24.

Van der Heijden, M. G. A., Bardgett, R.D., Van Straalen, N.M., 2008. The unseen majority: soil microbes as drivers of plant diversity and productivity in

terrestrial ecosystem. *Ecology Letters* 11, 296-310. Doi: 10.1111/j.1461-248.2007.01139.x.

Van der Heijden, M.G.A., Horton, T. R., 2009. Socialism in soil? The importance of mycorrhizal fungal networks for facilitation in natural ecosystems. *Journal of Ecology* 97(6), 1139-1150.

Van der Merwe, H., Van Rooyen, M.W., 2011. Vegetation trends following fire in the Roggeveld, Mountain Renosterveld, South Africa. *South African Journal of Botany* 77(1), 127-136.

Van der Putten, W.H., Bardgett, R.D., De Ruiter, P.C., Hol, W.H.G., Meyer, K.M., Bezemer, T.M., Wardle, D. A., 2009. Empirical and theoretical challenges in aboveground–belowground ecology. *Oecologia*, 161(1), 1-14.

Van der Putten, W.H., Vet, L.E.M., Harver, J.A., Wackers, F.L., 2001. Linking above and belowground multitrophic interactions of plants, herbivores, pathogens and their antagonists. *Trends in Ecology and Evolution* 16, 547-554.

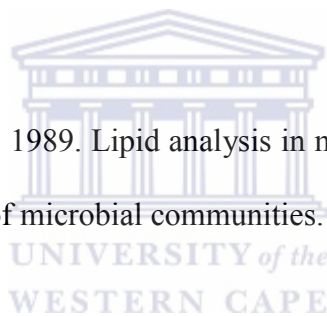
Van Eekeren, N., Van Liere, D., De Vries, F., Rutgers, M., De Goede, R., Brussaard, L., 2009. A mixture of grass and clover combines the positive effects of both plant species on selected soil biota. *Applied Soil Ecology* 42(3), 254-263.

Van Rooyen, S., 2003. Factors affecting alien grass invasion into Renosterveld fragments. MSc thesis, University of Stellenbosch.

Van Wyk, A.E., Smith, G.F., 2001. Regions of Floristic Endemism in southern Africa: a review with emphasis on succulents. Umdaus Press, Hatfield, South Africa.

Vance, C.P., 2001. Symbiotic nitrogen fixation and phosphorus acquisition: plant nutrition in a world of declining renewable resources. *Plant Physiology* 127, 390-397.

Vestal, J.R., White, D.C., 1989. Lipid analysis in microbial ecology: quantitative approaches to the study of microbial communities. *BioScience* 39, 535-541.



Viketoft, M., Sohlenius, B., Palmborg, C., Huss-Danell, K., Bengtsson, J., 2005. Plant species effects on soil nematode communities in experimental grasslands. *Applied Soil Ecology* 30, 90-103.

Von Hase, A., M., Maze, K., Helme, N., 2003. A fine-scale conservation plan for Cape lowlands renosterveld. Report No. CCU 2/03. Cape Conservation Unit: Botanical Society of South Africa, Cape Town.

Waldrop, M.P., Zak, D.R. Sinsabaugh, R.L., 2004. Microbial community response to nitrogen deposition in northern forest ecosystems. *Soil Biology and*

Biochemistry 36, 1443-1451.

Wall, D.H., 2012. Introduction, in: Wall, D.H., Bardgett, R.D., Behan-Pelletier, V., Herrick, J.E., Hefin Jones, T., Ritz, K., Six, J., Strong, D.R., Van der Putten, W.H. (Eds.), *Soil Ecology and Ecosystem Services*. Oxford University Press. Oxford, pp. 1-2.

Wall, D.H., Bardgett, R.D., Kelly, E., 2010. Biodiversity in the dark. *Nature Geoscience* 3(5), 297-298.

Wall, D.H., Behan-Pelletier, V., Covich, A.P., Snelgrove, R., 2007. Hidden assets: Biodiversity below-surface. UNESCO-SCOPE, Paris. Available at: <http://unesdoc.unesco.org/images/0015/001539/153945e.pdf>. Date accessed: 16 October 2014.

Wang, L., D'Odorico, P., Manzoni, S., Porporato, A., Macko, S., 2009. Carbon and nitrogen dynamics in southern African savannas: the effect of vegetation-induced patch-scale heterogeneities and large scale rainfall gradients. *Climatic Change* 94, 63-76.

Wardle, D.A., Bardgett, R.D., Klironomos, J.N., Setälä, H., Van der Putten, W.H., Wall, D.H., 2004. Ecological linkages between aboveground and belowground biota. *Science* 304, 1629-1633.

Wardle, D.A., Nilsson, M.C., Gallet, C., Zackrisson, O., 1998. An ecosystem level perspective of allelopathy. *Biological Reviews* 73, 305–319.

Watt J.M., Breyer-Brandwijk M.G., 1962. Medicinal and poisonous plants of southern and eastern Africa. E and S Livingstone, Edinburgh.

Wessels, K.J., Prince, S.D., Carroll, M., Malherbe, J., 2007. Relevance of rangeland degradation in semiarid northeastern South Africa to the nonequilibrium theory. *Ecological Applications* 17, 815-827.

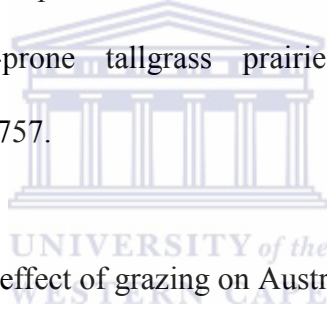
Wesuls, D., Strohbach, M., Horn, A., Kos, M., Zimmermann, J., Hoffmann, J., Geldenhuys, C., Dreber, N., Kellermann, L., Van Rooyen, M.W., Poschlod, P., 2010. Plant functional traits and types as a tool to analyse landuse impacts on vegetation, in: Schmiedel, U., Jürgens, N. (Eds.), *Biodiversity in southern Africa. Volume 2: Patterns and processes at regional scale*. Klaus Hess Publishers, Göttingen and Windhoek, pp. 222–232.

White, D.C., Stair, J.O., Ringelberg, D.B., 1996. Quantitative comparisons of in situ microbial biodiversity by signature biomarker analysis. *Journal of Industrial Microbiology* 17(3-4), 185-196.

Whitford, W.G., Aldon, E.F., Freckman, D.W., Steinberger, Y., Parker, L.W., 1989. Effects of organic amendments on soil biota on a degraded rangeland. *Journal of Range Management* 42(1), 56-60.

Wiegmann, K., Hennenberg, K.J., Fritsche, U.R., 2008. Degraded land and sustainable bioenergy feedstock production. Joint International Workshop on High Nature Value Criteria and Potential for Sustainable Use of Degraded Lands, Paris, France. Öko-Institut, Darmstadt. Available at: <http://np-net.pbworks.com/f/OEKO,%20RSB,%20UNEP%20et%20al%20%282008%29%20Degraded%20land%20and%20sustainable%20bioenergy%20feedstock%20production.pdf>. Date accessed: 20 October 2014.

Williams, M.A., 2007. Response of microbial communities to water stress in irrigated and drought-prone tallgrass prairie soils. *Soil Biology and Biochemistry* 39, 2750-2757.



Wilson, A.D., 1990. The effect of grazing on Australian ecosystems. *Proceedings of the Ecological Society of Australia* 16, 235-44.

Witmore, B., 2007. The behavioral timeline of sheep on semiarid rangelands and its inference using GPS and pedometry. IALC Peace Fellowship Final Report. New Mexico State University.

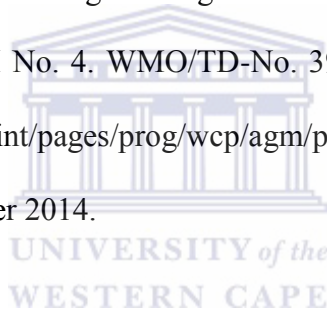
Wolters, V. 1991. Soil invertebrates – Effects on nutrient turnover and soil structure – a review. *Journal of Plant Nutrition and Soil Science* 154, 389-402.

Wolters, V., 2001. Biodiversity of soil animals and its function. *European*

Journal of Soil Biology 37, 221-227.

Wolters, V., Silver, W.L., Bignell, D.E., Coleman, D.C., Lavelle, P., Van der Putten, W.H., De Ruiter, P., Rusek, J., Wall, D.H., Wardle, D.A., Brussaard, L., Dangerfield, J.M., Brown, V.K., Giller, K.E., Hooper, D.U., Sala, O., Tiedje, J., Van Veen, J.A., 2000. Effects of global changes on above- and belowground biodiversity in terrestrial ecosystems: implications for ecosystem functioning. *Bioscience* 50, 1089-1098.

WMO, 1990. World Meteorological Organisation. Glossary of terms used in agrometeorology. CAgM No. 4. WMO/TD-No. 391. WMO, Geneva. Available at: http://www.wmo.int/pages/prog/wcp/agm/publications/cagm_reports.php.
Date accessed: 16 October 2014.



Wurst, S., De Deyn, G.B., Orwin, K., 2012. Soil Biodiversity and Functions, in: Wall, D.H., Bardgett, R.D., Behan-Pelletier, V., Herrick, J.E., Hefin Jones, T., Ritz, K., Six, J., Strong, D.R., Van der Putten, W.H. (Eds.), *Soil Ecology and Ecosystem Services*. Oxford University Press. Oxford, pp. 28-44.

Yachi, S., Loreau, M., 1999. Biodiversity and ecosystem productivity in a fluctuating environment: the insurance hypothesis. *Proceedings of the National Academy of Sciences* 96(4), 1463-1468.

Yanai, R.D., Majdi, H., Park, B.B., 2003. Measured and modelled differences in

nutrient concentrations between rhizosphere and bulk soil in a Norway spruce stand. *Plant and Soil* 257(1), 133-142.

Yeates, G.W., Bardgett, R.D., Cook, R., Hobbs, P.J., Bowling, P.J., Potter, J.F., 1997. Faunal and microbial diversity in three Welsh grassland soils under conventional and organic management regimes. *Journal of Applied Ecology* 34, 453-471.

Yeates, G.W., Bongers, T., De Goede, R.G.M., Freckman, D.W., Georgieva, S.S., 1993. Feeding habits in soil nematode families and genera - an outline for soil ecologists. *Journal of Nematology* 25, 315-331.

Zak, D.R., Holmes, W.E., White, D.C., Peacock, A.D., Tilman, D., 2003. Plant diversity, soil microbial communities, and ecosystem function: are there any links? *Ecology* 84(8), 2042-2050.

Zak, J.C., Willig, M.R., Moorhead, D.L., Wildman, H.G., 1994. Functional diversity of microbial communities: a quantitative approach. *Soil Biology and Biochemistry* 26, 1101-1108.

Zelles, L., 1999. Fatty acid patterns of phospholipids and lipopolysaccharides in the characterisation of microbial communities in soil: a review. *Biology and Fertility of Soils* 29, 111-129.

Zelles, L., Bai, Q.Y., Rackwitz, R., Chadwick, D., Beese, F., 1995. Determination of phospholipid- and lipopolysaccharide-derived fatty acids as an estimate of microbial biomass and community compositions in soils. *Biology and Fertility of Soils* 19, 115-123.

Zogg, G.P., Zak, D.R., Ringelberg, D.B., MacDonald, N.W., Pregitzer, K.S., White, D.C., 1997. Compositional and functional shifts in microbial communities due to soil warming. *Soil Science Society of America Journal* 61, 475-481.

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