SANTA CATARINA STATE UNIVERSITY – UDESC
SOIL SCIENCE GRADUATE PROGRAM
ENGLISH LANGUAGE PROFICIENCY EXAM

Lages (SC), September 27, 2020.

Test Evaluator: Professor Dr. Dennis Góss de Souza

Name: _____ Level: Masters [ ] Doctorate [ ]

General instructions:
1 - According to the public notice, the required level of English Language Proficiency for **master's** students is **"text comprehension"** while for **doctoral** students the requirement is **"text comprehension and writing".**
2 - To attend the notice, **master's** students would answer **questions 1, 2, and 3** while **doctoral** students would answer **questions 1, 2, 3, 4, and 5**, from the present exam.
3 - For both master's and doctoral students, the weights of the questions are equal.
4 - The test will last up to **180 minutes** and must be answered with a **blue or black** ballpoint **pen**.
5 - We recommend the candidate **to read the entire test**, before starting to answer the questions.
6 - During the exam, each candidate has the right to ask the test instructor once, in order to consult an English-English dictionary (provided by the instructor). Each candidate can **consult only one word** of their choice.

We wish you good luck!

TEMPLATE SHEET

Question 1) English to Portuguese translation. Translate the following text, including the title, which was extracted from ***Lal* (2020)**, Journal of Soil and Water Conservation, v. 75(4), p. 79-81, 2020.

Title: "SOIL SCIENCE BEYOND COVID-19"

"The fast-moving coronavirus disease 2019 (COVID-19) pandemic engulfed the world within four months from December to March of 2020, with long-lasting impacts on social, economic, political, educational, and scientific programs. It exacerbated risks of food and nutritional insecurity for a large segment of society, and threats of disruption in the food supply chain may be aggravated by climate change, soil degradation, and the flood/drought syndrome. Ensuring adequate access to nutritious food is a daunting challenge even in developed/scientifically advanced countries, and is a sheer tragedy in poor nations. […] The sudden collapse caused by COVID-19 indicates fragility of humanity even to a microscopic foe. Cruel as it may seem, COVID-19 has accomplished what COP21 (the 2015 United Nations Climate Change Conference of Parties) and other initiatives could not. Atmospheric levels of carbon dioxide (CO_2) have not risen during March and April of 2020. […] The COVID-19 pandemic may be a symptom of the increasing interaction between humans and the animal kingdom. Habitat has been altered by deforestation, in-field voluntary and intentional burning, excessive plowing and inundation by irrigation, indiscriminate use of chemicals, inappropriate use of natural resources, and of course, addiction to fossil fuel. Large-scale conversion of natural ecosystems to managed landscapes, necessitated by the insatiable demands of a growing and increasingly affluent human population, has exacerbated interactions between humans and other animals. Increase in intensity and frequency of pandemics since the onset of twentieth century, of which COVID-19 is just one unfortunate event, indicates progressive increase in intensity and severity of such interactions, which are being aggravated by the anthropogenic climate change."

267 words

Tradução:

Título: "CIÊNCIA DO SOLO ALÉM DA COVID-19"

"A acelerada (agressiva) doença do coronavírus (COVID-19) engolfou (submergiu, inundou) o mundo em quatro meses, de dezembro a março de 2020, com impactos duradouros nos programas sociais, econômicos, políticos, educacionais e científicos. Ela (e) exacerbou (agravou) os riscos de insegurança alimentar e nutricional para um grande segmento da sociedade, e as ameaças de interrupção na cadeia de abastecimento de alimentos podem ser agravadas pelas mudanças climáticas, degradação do solo e a síndrome das enchentes/secas. Garantir o acesso adequado a alimentos nutritivos é um desafio assustador, mesmo em países desenvolvidos/cientificamente avançados, e é uma pura (absoluta, verdadeira, completa) tragédia nos países pobres. [...] O colapso repentino causado pela COVID-19 indica fragilidade da humanidade até mesmo para um inimigo microscópico. Por mais cruel que possa parecer, a COVID-19 conseguiu o que a COP21 (Conferência das Partes sobre Mudanças Climáticas das Nações Unidas de 2015) e outras iniciativas não conseguiram. Os níveis atmosféricos de dióxido de carbono (CO_2) não aumentaram durante março e abril de 2020. [...] A pandemia de COVID-19 pode ser um sintoma da crescente interação entre os humanos e o reino animal. O habitat tem sido alterado pelo desmatamento, queima voluntária e intencional no campo, aração excessiva e inundação por irrigação, uso indiscriminado de produtos químicos, uso inadequado de recursos naturais e, claro, vício (dependência) em (de) combustível fóssil. A conversão em grande escala de ecossistemas naturais em paisagens manejadas, necessária pelas demandas insaciáveis de uma população humana crescente e cada vez mais abundante, exacerbou (agravou) as interações entre humanos e outros animais. O aumento na intensidade e frequência das pandemias desde o início do século XX, das quais a COVID-19 é apenas um evento infeliz, indica aumento progressivo na intensidade e severidade (gravidade) de tais interações, que estão sendo agravadas pelas mudanças climáticas antropogênicas."

Question 2) English to Portuguese translation and comprehension test. Translate the following text, including the title, which was extracted from ***Varney et al*. (2020)**, Nature Communications, v. 11, p. 1-8.

Title: "A SPATIAL EMERGENT CONSTRAINT ON THE SENSITIVITY OF SOIL CARBON TURNOVER TO GLOBAL WARMING"

"Climate–carbon cycle feedbacks must be understood and quantified if the Paris Agreement Targets are to be met. Changes in soil carbon represent a particularly large uncertainty, with the potential to significantly reduce the carbon budget for climate stabilisation at 2°C global warming. Previous studies have investigated the response of soil carbon to climate change based on both observational studies and Earth System Models (ESMs). ESMs are coupled models which simulate both climate and carbon cycle processes. Projects such as the Coupled Model Inter-comparison Project (CMIP), have allowed for consistent comparison of the response of soil carbon under climate change from existing state-of-the-art ESMs. […] This study uses an alternative method to obtain a constraint on the ESM projections of soil carbon change. In previous studies, emergent constraints based on temporal trends and variations have been used successfully to reduce uncertainty in climate change projections. […] Our study combines the Chadburn et al. (2017) method with the soil carbon turnover analysis of Koven et al. (2017) to get a constraint on the sensitivity of soil carbon turnover to global

warming. Soil carbon (C_s) is increased by the flux of organic carbon into the soil from plant litter and roots, and decreased by the break-down of that organic matter by soil microbes which releases CO_2 to the atmosphere as the heterotrophic respiration flux (R_h). If the vegetation carbon is at steady-state, litter-fall will equal the Net Primary Production of plants (NPP). If the soil carbon is also near to a steady-state—and in the absence of significant fire fluxes and other non-respiratory carbon losses—the litter-fall, NPP, and R_h will be approximately equal to one another."

289 words

Tradução:

Título: "UMA EMERGENTE RESTRIÇÃO ESPACIAL NA SENSIBILIDADE DA CICLAGEM DO CARBONO DO SOLO AO AQUECIMENTO GLOBAL"

"As respostas do ciclo do carbono ao clima devem ser compreendidas (entendidas) e quantificadas para que as Metas do Acordo de Paris sejam cumpridas. Mudanças no carbono do solo representam uma incerteza particularmente grande, com potencial para reduzir significativamente o orçamento (previsão) de carbono para a estabilização do clima em 2°C de aquecimento global. Estudos anteriores (prévios) investigaram a resposta do carbono do solo às mudanças climáticas com base em estudos observacionais e Modelos de Sistemas Terrestres (MSTs). MSTs são modelos acoplados (conjuntos) que simulam ambos os processos climáticos e do ciclo do carbono. Projetos como o Projeto de Intercomparação de Modelo Acoplado (Conjunto) (PIMA/PIMC) permitiram uma comparação consistente da resposta do carbono do solo às mudanças climáticas a partir de MSTs de última geração existentes. […] Este estudo usa um método alternativo para obter uma restrição (controle) nas projeções MST de mudança de carbono do solo. Em estudos anteriores, as restrições (controles) emergentes baseadas em tendências e variações temporais foram usadas com sucesso para reduzir a incerteza nas projeções das mudanças climáticas. [...] Nosso estudo combina o método de Chadburn et al. (2017) com a análise de ciclagem de carbono do solo de Koven et al. (2017) para obter uma restrição (controle) sobre a sensibilidade da ciclagem do carbono do solo ao aquecimento global. O carbono do solo (Cs) é aumentado pelo fluxo de carbono orgânico para o (dentro do) solo (vindo) da serapilheira e raízes, e diminuído pela decomposição dessa matéria orgânica por micróbios (micro-organismos/microrganismos) do solo que liberam CO_2 para a atmosfera como o (na forma de) fluxo de respiração heterotrófica (Rh). Se o carbono da vegetação estiver em estado estacionário, a queda de serapilheira (liteira) será igual à Produção Primária Líquida das plantas (NPP). Se o carbono do solo também estiver próximo de um estado estacionário—e na ausência de fluxos de fogo significativos e outras perdas de carbono não respiratória —a queda da serapilheira (liteira), NPP e Rh serão aproximadamente iguais um (ns) ao (s) outro (s)."

After reading, **answer** the following question, **in Portuguese**:

– According to the selected text, which was the main hypothesis tested by the authors?

Alternativa 1) O carbono do solo (Cs) é aumentado pelo fluxo de carbono orgânico para o (dentro do) solo (vindo) da serapilheira e raízes, e diminuído pela decomposição dessa matéria orgânica por micróbios (micro-

organismos/microrganismos) do solo que liberam CO2 para a atmosfera como o (na forma de) fluxo de respiração heterotrófica (Rh).

Alternativa 2) Se o carbono da vegetação estiver em estado estacionário, a queda de serapilheira (liteira) será igual à Produção Primária Líquida das plantas (NPP).

Alternativa 3) Se o carbono do solo também estiver próximo de um estado estacionário—e na ausência de fluxos de fogo significativos e outras perdas de carbono não respiratória —a queda da serapilheira (liteira), NPP e Rh serão aproximadamente iguais um (ns) ao (s) outro (s).”

Alternativa 4) Resposta semelhante às três acima enumeradas.

Question 3) English to Portuguese translation. Translate the following text, including the title, extracted from ***Veldkamp et al.* (2020)**, Nature Reviews Earth & Environment, v. 1, p. 590-605.

Title: “DEFORESTATION AND REFORESTATION IMPACTS ON SOILS IN THE TROPICS”

“Soils under natural, tropical forests provide essential ecosystem services that have been shaped by long-term soil–vegetation feedbacks. However, deforestation of tropical forest, with a net rate of 5.5 million hectares annually in 2010–2015, profoundly impacts soil properties and functions. Reforestation is also prominent in the tropics, again altering the state and functioning of the underlying soils. In this Review, we discuss the substantial changes in dynamic soil properties following deforestation and during reforestation. Changes associated with deforestation continue for decades after forest clearing eventually extend to deep subsoils and strongly affect soil functions, including nutrient storage and recycling, carbon storage and greenhouse gas emissions, erosion resistance and water storage, drainage and filtration. Reforestation reverses many of the effects of deforestation, mainly in the topsoil, but such restoration can take decades and the resulting soil properties still deviate from those under natural forests. Improved management of soil organic matter in converted land uses can moderate or reduce the ecologically deleterious effects of deforestation on soils. We emphasize the importance of soil knowledge not only in cross-disciplinary research on deforestation and reforestation but also in developing effective incentives and policies to reduce deforestation.”

202 words

Tradução:

Título: “IMPACTOS DE DESMATAMENTO E REFLORESTAMENTO NOS SOLOS NOS (DOS) TRÓPICOS”

“ Solos sob florestas tropicais naturais fornecem serviços ecossistêmicos essenciais que foram moldados por respostas de solo-vegetação de longo prazo. No entanto, o desmatamento da floresta tropical, com uma taxa líquida de 5,5 milhões de hectares anuais em 2010-2015, impacta profundamente as propriedades e funções do solo. O reflorestamento também é proeminente nos trópicos, novamente alterando o estado e o funcionamento dos solos subjacentes. Nesta revisão, nós discutimos as mudanças substanciais em propriedades dinâmicas do solo após o desmatamento e durante o reflorestamento. As mudanças associadas ao desmatamento continuam por décadas após o desmatamento da floresta eventualmente se estendem aos subsolos profundos e afetam fortemente as funções do solo, incluindo armazenamento e reciclagem de

nutrientes, armazenamento de carbono e emissões de gases de efeito estufa, resistência à erosão e armazenamento de água, drenagem e filtração. O reflorestamento reverte muitos dos efeitos do desmatamento, principalmente na camada superficial do solo, mas essa restauração pode levar décadas e as propriedades do solo resultantes ainda divergem daquelas sob as florestas naturais. O manejo aprimorado da matéria orgânica do solo nos usos da terra convertidos pode moderar ou reduzir os efeitos ecologicamente deletérios do desmatamento nos solos. Nós enfatizamos a importância do conhecimento do solo não apenas em pesquisas interdisciplinares sobre desmatamento e reflorestamento, mas também no desenvolvimento de incentivos e políticas eficazes para reduzir o desmatamento.**”**

Keep reading...

Question 4) ***Only for doctoral students*** **– Portuguese to English translation.** Translate the following text, including the title, extracted from ***Araújo et al.*** **(2013)**, Ciência Rural, v. 43(5), p. 854-860.

Título: “ETNOPEDOLOGIA: UMA ABORDAGEM DAS ETNOCIÊNCIAS SOBRE AS RELAÇÕES ENTRE AS SOCIEDADES E OS SOLOS”

“A avaliação do conjunto de conhecimentos gerados e transmitidos por populações humanas caracteriza-se como o campo de atuação dos estudos etnocientíficos. Esta avaliação de conhecimentos relacionados aos solos e sua associação com recursos naturais, bem como estratégias desenvolvidas para produção são os objetos de estudo da etnopedologia. A utilização de metodologias participativas que promovam a inserção direta dos envolvidos na pesquisa são premissas básicas nos trabalhos etnopedológicos. As áreas de avaliação etnopedológicas relacionam-se, dentre outros aspectos, a nomenclaturas para classificação das terras e práticas de manejo. O crescente desenvolvimento etnopedológico revela o reconhecimento da importância do solo como um recurso limitado e essencial para a vida e reforça uma visão conservacionista importante a ser considerada na construção de trabalhos na área de ciências do solo.”

139 palavras

Translate:

Title: “ETHNOPEDOLOGY: AN ETHNOSCIENCES APPROACH ON THE RELATIONS BETWEEN SOCIETIES AND SOILS”

“The evaluation of the set of knowledge generated and transmitted by human populations is characterized as the field of action of the ethnoscientific studies. This evaluation of knowledge related to soils and their association with natural resources, as well as strategies developed for production, are the objects of study in ethnopedology. The use of participatory methodologies that promote the direct insertion of those involved in the research is a basic (are basic) premise (s) in ethnopedological works. The ethnopedological assessment areas are related, among other aspects, to nomenclatures for land classification and management practices. The growing ethnopedological development reveals the recognition of the soil importance as a limited and essential resource for life and reinforces an important conservationist vision to be considered in the construction of works in the field of soil science.**”**

Question 5) ***Only for doctoral students*** **– English to English comprehension test.** First, read the following text, extracted from the ***Editorial Letter*** **(2021),** Nature Ecology and Evolution, v. 5, p. 1049.

Title: "AGRICULTURE ISN'T ALL ROCKET SCIENCE"

"One lesson that the COVID-19 pandemic has emphasized is that low-tech approaches can be as important as high-tech ones. For example, behavioural interventions such as face masks and social distancing can dramatically reduce infection transmission in the absence of vaccines, at least in the short term. A similar principle applies to food security— a range of ecological and evolutionary approaches are often overlooked in favour of more sophisticated and potentially more expensive technologies. One such approach is mixing varieties within a single crop to improve yield, yield stability and disease resistance […]. Other agroecological approaches include integrated pest management, in which farmers attempt to keep pests at acceptable levels rather than eliminate them, using chemical control only as a last resort, and integrated soil–crop system management, in which farmers minimize nutrient use through a detailed consideration of local soil conditions and appropriate selection of varieties. Both of these approaches apply ecological knowledge and existing technologies to improve yields and reduce environmental impacts. Another recent study in this journal examined the economic and yield benefits of the agroecological approach of biological pest control, compared with 'Green Revolution' improvements to crops. […] It's simplistic to suggest that all agroecological approaches are low-tech, but many of them make use of existing crop varieties, which are less likely to require monetary investments on the scale that crop improvement through genetic technology or even conventional breeding can involve. And yet, they can make substantial contributions to food security, either now or after further development, and it is possible to put monetary values on these contributions. Indeed, ten years ago, in a very high-level global analysis, Foley et al. (2011) showed that optimizing yields and environmental protection involves a range of fairly simple solutions alongside improved technology. The benefits of ecologically informed agricultural practices are for both people and nature, and can be considered either as direct benefits or public goods (although the two can overlap). Improving yields and reducing losses to pests are obvious benefits to individual farmers, but so are improved local soil quality and other ecosystem services."

After reading, answer the following questions, **in English**:

– According to the extracted text, what is the interplay between low- and high-tech approaches for food security and crop management?

Answer: open interpretation.

– How could you, as a Soil Scientist, take advantage of your soil science knowledge and skills, acquired in the Soil Science Graduate Program, to apply low- and high-tech solutions for soil management and crop production?

Answer: open interpretation.

Now that you have read all the questions, choose one of them to leave blank, so that you can save time to answer the other questions.