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Soil Temperatures, Water and Humus Conservation of the Transylvanian Plain, Romania

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The Transylvanian Plain (TP), Romania is an important region for agronomic productivity. However, limited soils data and adoption of best management practices can hinder land productivity. Soil temperatures of the Transylvanian Plain were evaluated using a set of twenty datalogging stations positioned throughout the plain. Soil temperatures were monitored at the surface, 10 cm, 30 cm, and 50 cm, and soil moisture was monitored at 10 cm. Pedons were excavated, described, and sampled for physicochemical analysis. Preliminary results indicate that most soils of the Transylvanian Plain will have a mesic temperature regime. However, differences in seasonal warming and cooling trends across the plain were noted. These have important implications for planting recommendations. Some soils of the plain were noted to freeze at 50 cm, while others did not. Longer term study of temperatures of the Transylvanian Plain will average out annual variation in soil temperature and evaluate the impact of slope aspect, slope inclination, soil moisture, and physicochemical properties on soil temperatures.Analysis of collected samples shows soil textures were mostly clay, silty clay, silty clay loam, and clay loam. Organic carbon percentage at the surface was typically ∼3-4% and decreased to ∼1-2% in the subsoil. Elemental analysis showed the following averages between surface and subsoils across sites 1-10: 325 mg kg-1 (P), 888 mg kg-1 (K), 5,605 mg kg-1 (Ca), 442 mg kg-1 (Mg), 16 mg kg-1 (Zn), 5 mg kg-1 (Cu), 39 mg kg-1 (Na), and 29 mg kg-1 (S).
Climate of the TP is highly dynamic, ranging from hot summers with high temperatures of >25°C to very cold winters with lows ∼-5°C. The southern TP generally has a xeric moisture regime with steppe vegetation while moisture increases somewhat in the northern TP as an udic moisture regime.
Calculation of soil temperature regime according to the Soil Survey Staff (2006) consists of averaging soil temperatures at 50 cm between summer (June, July, and August) and winter (December, January, and February). The Soil Survey Staff (2006) defines mesic soil temperature as a "mean annual soil temperature that is >8°C, but <15°C where the difference between mean summer and mean winter soil temperatures is more than 6°C at 50 cm or at a densic, lithic, or paralithic contact, whichever is shallower." Year 1 data from sites 1-10 show that all sites have a mean annual soil temperature of ∼10°C at 50 cm with more than 6°C variation between summer and winter. Thus, it appears as though mesic is the appropriate soil temperature regime for soils of the TP. However, the data also indicate seasonal differences in warming and cooling patterns across the TP which will be used to create planting recommendations for farmers to optimize crop germination.