EGU2020-7469, updated on 17 Oct 2021
https://doi.org/10.5194/egusphere-egu2020-7469
EGU General Assembly 2020
© Author(s) 2021. This work is distributed under
the Creative Commons Attribution 4.0 License.

Phytoindicators of marginal saline lands: Potential for improving dryland management to increase agroecosystem resilience and productivity

Kristina Toderich[1], Elena Shuyskaya[2], Marina Lebedeva[3], Temur Khujanazarov[4], and Hidenari Yasui[5]

[1]Tottori University, Arid Land Research Center, International Platform for Dryland Research and Education, Japan (ktoderich@gmail.com)

[2]K.A. Timiryazev Institute of Plant Physiology RAS, IPP RAS, 35 Botanicheskaya St., Moscow, 127276 Russia.

[3]V.V. Dokuchaev Soil Science Institute, Russia

[4]Disaster Prevention Research Institute, Kyoto University, Japan

[5]Faculty of Environmental Engineering, Kitakiyushu Univeristy, Japan.

Throughout the world, the arable agricultural lands are already fully utilized, and hence **marginal land**, including **saline** land, is being brought into consideration. Owing to its geographical and climatic characteristics, aggravated by impacts of climate change and anthropogenic pressures, Central Asian countries (CACs) are facing serious food and nutrition security challenges. Current agropastoral and farming-livestock systems have little experience in designing and implementing climate-smart land-use initiatives from so-called 'marginal lands'. As an instance, a land that is "marginal" for crop production may be well suited for grazing, bio-energy production, silvi-pastoral use. "Fragile" land may be sensitive to degradation under cultivation but may be sustainable used for agroforestry and afforestation practices. Nowadays there is not a world-known definition of the extent and characteristics of categories of marginal lands. Purposes of study: (1) investigate if land-use types have discrete, quantifiable vegetation characteristics; and (2) if these also have discrete soil characteristics. Overall goal: in future, use the information to (1) characterize land use over the entire district and (2) better manage land to make more productive, increasing food and nutrition security of the local population. Quantitative and qualitative assessment of vegetation condition of 6 land categories were performed using plant communities' characteristics, species composition, canopy cover and biomass production along a salinity gradient. We rank the sites by their content of sodium ions in the salt surface crusts and the underlying soil horizons. The majority of lands of research target areas are strongly saline at the surface and with a vertical distribution of salinity typically down to a depth of 10 cm (with a maximum depth to 18 cm). This distribution of readily soluble salts is due to the proximity of saline groundwater. With extreme arid climatic conditions, the toxic salts can be readily drawn upward toward the surface. Differences between sites are observed by the extent of salinization of the middle and lower soil horizons. The first land clusters are very high in salt content throughout the depth of the soil. The second group consists of lands in which salinity of the middle and lower soil horizons does not get above the mean (>0.3%). There is quite low salinity (> 0.1%) immediately under the salt crust, (as

estimated by the total amount of toxic salts). Investigated lands categories differed in plant functional types (glycophytes>euhalophytes>recretohalophytes). As soil salinity increased, the proportion of the perennial growth form increased from ~60% of species in sites with lower soil salinity to 100% in the natural solonchak with the greatest soil salinity. Remediation measures and multi-purpose use of marginal lands, such as saline lands; degraded pastures, abandoned farmer lands; wastelands surrounding water bodies and hydrothermal wells, field margins; tugay forest wetlands were recommended.