About the Region

**Land Area:** 79 million ha (35 million ha rangelands).

**Environment:** Low and highly variable rainfall; extreme temperatures; mountains, deserts, steppe landscape. Diverse agriculture with high growth potential.

**Economies:** In structural transition from centrally planned to market-driven economies; decline in rural

---

Utilization of Halophyte Biomass for Biogas Production

**Name of the Organization and e-mail address:**
Dr. Kristina Toderich
Regional representative of the International Center for Biosaline Agriculture (ICBA) at Program Facilitation Unit, CGIAR Program for Central Asia and the Caucasus (CAC) / Regional Program of the International Center For Agricultural Research In The Dry Areas (ICARDA) for the CAC Region
Tashkent, Uzbekistan

**Mail Address:**
Program Facilitation Unit, P.O. Box 4564, Tashkent, 100000, Uzbekistan
Street Address: 6, Murtazaev Street, Tashkent,
Objectives of the action

**Overall objective:** To use marginal water and degraded saline lands as a great potential source for biomass production. To use biomass of halophytes (inedible biomass!) as a valuable source of methane-gas and important source of secure and sustainable energy in arid lands

**Specific objectives**
- On-farm establishment of renewable energy production options (wild or domesticated halophytes) on marginal lands;
- Using of anaerobic digestion (AD) of halophyte biomass for bioenergy (biogas) production;
- Development of AD-technology for halophyte biomass;
- To design some mini biogas reactor for one-two cattle-farms;
- Desalination, recovering of soil productivity.

**Results**
- Anaerobic degradation of wild halophytes (Kalidium caspicum, Salicornia europaea and Climacoptera lanata) from solonchaks of Kyzylkum desert was studied.
- Lab-scale reactors were fed with dried and milled plant biomass. Tests were operated under batch and continuous mode at mesophilic (M) and thermophilic (T) temperatures.
- High content of chlorides, sulphates, sodium and potassium and low concentrations of nutrients were revealed.
- Batch-tests showed that total methane-yields at M and T conditions were similar. Maximum biogas was produced in result of anaerobic degradation of Kalidium caspicum (about 1000 mL CH4 from 1L of sludge at T and M-conditions).
- Obtained results revealed that 72-90% organic fraction of K.caspicum and 54-90% of S.europaea can be decomposed to CH4 at 35ºC within 30-days whereas approximately 50-70% of conversion was identified from the degradation of C.lanata.
- At T-conditions about 45-70% organic matter of plant biomass were conversed into methane.
- Incubation at 55ºC accelerated the CH4 conversion rate up to 2 times.
- Preliminary study of anaerobic digestion of plant biomass under continuous mode demonstrated that it is possible to get about 300-500 mL CH4 from 1L of anaerobic digestion sludge per day.

**Partners**
National University of Uzbekistan named after M.Ulugbek
(NUUs), Tashkent, Uzbekistan
The University of Kitakyushu
Kitakyushu, Fukuoka, Japan

**Target groups**
Small, remote, rural communities with limited energy supply.

**Final beneficiaries**
Small farmers and small rural enterprises (technologies); students (capacity building); society (clean, sustainable energy production).