

6th International Meeting on Soils with Mediterranean Type of Climate

6th IMSMTC



EXTENDED ABSTRACTS

EDITOR: J. Bech

4-9 JULY

BARCELONA (SPAIN)

SOILS WITH MEDITERRANEAN TYPE OF CLIMATE: EAST PART OF CENTRAL ASIA

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INTRODUCTION

The belt of soils distribution with Mediterranean type of climate stretches from West to East of Euro-Asian continent. Eastern part of this belt is located on the territory Tajikistan.

This territory is divided on climatic areas by the mountain systems of Tien-Shan and Pamir-Allay. There are three types of structures of vertical belt soils: 1). South-West-Central region; 2). Northern region; 3). Pamir region. Soil with Mediterranean type of climate is formed in South-West-Central area.

For climate parameters estimation we used climatic data of hydrometeorological stations, which are located at different heights from 300 up to 3300 m. Duration of observation on these stations is about 70 years. The temperature data from 37 stations and precipitation data from 73 stations were analysed. Coefficient of humidification was calculated for 34 stations. Approximate curves of climatic parameter changes with height were calculated and climatic borders of each soil belt were determined.

CLIMATE AND SOIL

The belt of arid and subhumid climate with very warm summer, mild winter and temperately mild winter covers heights from 300 m up to 1200 m. Average annual temperature of air is 12° - 17°C. Average monthly temperature of January is positive (1° - 2°C), and in July varies from 28° up to 32°C. The precipitation quantity changes from 178 mm up to 900 mm per year. The precipitation of cold half-year is 70-75 % of annual sums. Snow cover is insignificant and unstable. Coefficient of humidification is calculated according to the next formula: $K_w = A/E_o$, where A - precipitation per year, E_o - evaporativity per year. This coefficient varies from 0,1 up to 0,55.

Sierozem type of soils is formed in this climatic zone. These soils are divided on three subtypes: 1. Clear sierozem, forming in the bottom part of the belt; 2. Typical sierozem, developing in the average part of the belt; 3. Dark sierozem, covering the top part of the belt. Sierozem is formed in conditions of

impermeable water regime. They contain significant quantity of carbonate (10 % - 35 %). The humus quantity in humus horizon is 1,0 % - 2,8 % (Sosin, 1975).

The vegetation is represented by xerophilous plants of low grass semi-savanne and large gramineous plant semi-savanne (*Poa bulbosa*, *Phlomis bucharica*, *Hordeum spontaneum* and other). On dark sierozem there is wood vegetation (*Pistacia Vera*, *Amigdalus bucharica* and other) (Sidorenko, 1961).

The belt of subhumid and humid climate with warm summer and temperately mild winter is located at heights from 1200 m. up to 2700 m. a.s.l. Average annual temperature of air varies from 3° up to 12°C. Average temperature in January changes from 1° up to 7°C, in July - from 22° up to 24°C. Atmospheric precipitation is 900 - 1200 mm per year. During the year the precipitation is distributed equally. In winter snow cover is steady. Coefficient of humidification is 0,55 - 1,2.

In this climatic belt cinnamon mountain soils are formed. They are divided into three subtypes: 1). Calcaric cinnamon soil, forming in the bottom part of the belt with subtropical temperately warm climate. They contain calcareous calcium from 1 % up to 32 % with maximum in the bottom part of the layer; 2). Typical cinnamon soil, occupying an average part of the belt with subhumid climate; 3). Leached cinnamon soil is located in top humid part of the belt. They completely leached of calcareous. Cinnamon soil is formed in conditions from impermeable (calcaric cinnamon soil) up to permeable (leached cinnamon soil) water regime.

The humus contents in horizon (A) of non-erodible soil grows from calcaric cinnamon soil (3,6 %) up to leached cinnamon soil (9,0 %). There are relict attributes in cinnamon soil, which meet soil formation in other climatic conditions during Holocene (Sosin, 1989).

For lower, more xerophitic part of the belt, vegetation of large gramineous plant semi-savanne with domination of *Hordeum spontaneum*, *Eritrigia trichophora* is typical. *Amygdalus Bucharica*, *Ziziphus jujula*, *Cercis Griffithii* are from wood. In higher parts of this belt mezophile wood vegetation is widespread (*Junipirus turcestanica*, *Juglans regia*, *Londesia fischet mey*, *Acecaceal Juss*).

The belt of subhumid climate with temperately warm summer, temperately mild and temperately cold snow winter covers mountainous regions up to height of 3300 m. Average annual temperature of air is in limits from -2° up to + 3°C. Average temperature of January varies from -4° up to -12°C, and in July temperature rises up to 9,7°C. Annual precipitation is 840 - 1150 mm. Solid precipitation is up to 74 % from the total. Coefficient of humidification changes from 1,2 up to 1,4. Alpine meadow-steppe soil is completely leached of calcareous calcium and contains 5,9 % - 8,9 % of humus.

The vegetation is represented by large gramineous plant semi-savanne with

typical *Ferula*, *Prangos* and other. In the top part of zone there is tipchak steppe with spot tragacanth.

DISCUSSION AND RESULTS

The subtropical region of Tajikistan is located far from sea areas. Western part is opened for warm damp air from the Mediterranean Sea. Mountain ranges prevent the penetration of cold air from Siberia and Mongolia and catch moisture of western air flows. Such geographical and climatic reasons create conditions for soil formation of Mediterranean type.

Annual temperature diapason of formation mountain cinnamon soil (9°C) exceeds diapason (5°C) sierozem and alpine soil almost twice. Coefficient of humidification increases equally from sierozem up to alpine meadow-steppe soil.

All soils are formed during the optimum temperature and humidity period for evolution of biological processes. Therefore, soil formation of sierozem occurs in winter-autumn period, alpine cinnamon soil develops in spring-summer and partially autumn period, and alpine meadow-steppe soil forms in the warmest summer months.

For the last century in this region there was the increase of average annual temperature on 1,4°C, and precipitation on 15-25 % (Finaev, 1998). However, we can not tell, what was the reaction of soil formation processes on these climate changes.

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