Global Warming and Change of Agroecological Zones

Maia Meladze
maia.meladze@tsu.ge
Department of Geography, TSU, 3 ave. I.Chavchavadze, build. II

Global climate warming creates huge danger to the ecological balance established millions of years ago. Based on the conclusions of the researchers, anomalistic eocological occurrences in biosphere are conditioned by the unforeseen anthropogenic effect. In particular, heating of fossil fuel, emission of CO_2 and other ,,greenhouse gas" leaking from industrial plants and autotransport. All this creates in the atmosphere the so-called ,,greenhouse effect", which contributes to raise of air temperature. East Georgia is more inclined to temperature raise compared to west Georgia. Even one-degree rise in temperature might be of great practical importance for agriculture. It might lead to the shift of isotherms on the surface of the earth, which will be followed by the change of width dislocation of this or that district, growth-development of adapted crops is already under way in this condition. That's why, we must know in advance the temperature regime and its influence on productivity of crops, their vulnerability against climate variations and transformation of dissemination zone.

According to altitude of locations in Western Georgia, at 1^0C temperature rise is being projected for the agroecological zone scenario of the distribution of crops, and a 2 ^{0}C rise in Eastern Georgia. Based on the above, agroecological zones with active temperature sums over 10 ^{0}C at 1000^0C gradation have been marked out. Scenarios for distribution of crops in the agroecological zones have been developed.

The date of long-term observations conducted at the hydrometeorological stations existing in Georgia have been analyzed. In particular, the dates of temperature rise above 10^0C and active temperature sums together with the locations' altitudes above sea level. A close correlation has been detected upon temperature rise of 1 and 2^0C (respectively) under the developed scenarios: R=0.99 for Western Georgia, R=0.98 for Eastern Georgia and R=0.97 for all Georgia. Based on the established correlation, regression equations were formulated:

For all Georgia T= -29.294n-0.788h+6081
For Western Georgia T= -16.7115n-1.127h+5496
For Eastern Georgia T= -44.254n-0.1504h+6742

In the equations, T is the active temperature sum over 10°C, n is the number of days from February 1 to the date when the temperature rises over 10°C, h is altitude above sea level (in m).

According to the completed regression equations, the active temperature sums at a 1000^0-gradation of air temperature (above 10^0) are determined. Five agroecological zones for distribution of respective crops are marked out for the territory of Georgia in the case of a rise by 1 and 2 degrees under the developed scenarios, according to which in the case of a rise in temperature by 1 and 2 degrees, the active temperature sum exceeds on average the active temperature sum in the currently existing zones by 200-300 degrees and 400-500 degrees, respectively.