Assessment of agro-climate resources of Moldova

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The agroclimatical conditions of the territory of Moldova are very variable. This fact is caused by relief of territory, vegetation, water basins, type of soils and exposition of hills etc. Besides, the climatic phenomena influence the state of the agro climatic resources of Moldova.

The scope of our research work is to identify the occurred climatic changes on the territory of Moldova and determinate the influence of that upon the productivity of agriculture plants.

Solar radiation. In the purposes of identification of the tendences of changes of solar radiation - direct, summarized, dispersional, reflected and the radiational balance, we provided the calculation of the average month and seasonal data. The trend lines were designed and calculation provided using the equations of these trends for the component parts of radiation balance.

In accordance to calculations made it was concerned that during the last decades the increasing of the direct solar radiation on the territory of Moldova was observed. In accountable expression there is the following- in fall and winter seasons the annual increasing of direct solar radiation is of 1,0 and 2,5 mDj/m2 , and in spring and summer seasons - 7,6 and 14,0.

The quantity data of the summarized radiation, besides the fall months, were increased. The annual grow of the summarized radiation constitute - in spring 4,4, summer 9,5 and winter 1,9. In falls months there were observed decreasing of summarized radiation, that constitute 1,8.

The obtained equations of trends show the diminution of the dispersal radiation.Average data during a year demonstrate a diminution of dispersal radiation and constitute - 0,7 in winter, 2,3 and 2,7 in spring and fall and 3,8 - in summer months.

A diminution of reflection radiation was observed during spring and winter months consequently with 0,21 and 0,26 annually. An increasing of reflection radiation data were observed in summer and fall, and is accounting 0,84 and 0,48. According to the calculations made, a trend for decreasing of the radiation balance data was noted. The annual decrease of the balance constitute : 0,45 in falls, 1,0 in winter, and 2,8 in summer period.

Air termic regime. The multiannual data shows that the average annual air tempera-

ture in Moldova is about 8-10C. According to the research data , during the last ten years the termic regime has undertake some considerable changes. Thus, the average temperature of winter months by 2005 increased with 0,7-0,9C, in comparison with 50ths.

Analyzing the agro climatic conditions during 1991-2000, it was observed that during 7 of 10 years the stabile transfer of average day's temperature of air has occurred in earlier with 15-45 days in comparison of average multiannual data in the central part of the country. In the South - in 6 from 10 years were observed earlier with10-35 days. At the same time, the data of the air temperature transfer through 5, 10,15C is closed with the multiannual data. Atmospheric precipitations. The sum of the multiannual atmospheric precipitation varies from 490 to 720 mm in the country. In spring season the level of atmospheric precipitation is increasing, as usually, and the distribution of precipitation over the territory has an irregular character. In general, the rain precipitation increased with 57-82 mm (the annual increase constitute 1,04-1,5 mm). The amplitude of sums of the spring precipitations during the period reached to 100mm and more. The tendency of summer precipitations was positive (besides of those obtained from Chisinau Meteostation). According to the equation of trends the increasing of precipitations during this period constitute 0,03-0,62 mm/year, and in sum for the period of observation increased with16,5-34,1 mm. In fall periods there were observed increasing of precipitations in the northern part of the country with 0,55-0,65 mm, in the Tiraspol and Chisinau areas - 0,98-1,04 mm/year. In winter season the quantity of precipitation increase with 0,05-0,27 mm/yearly. In the period of 1960-2000 there were observed a tendency of changes of the snow coverage level. Thus in 2000 in the South the breadth of the snow decreased in medium with 5-6 cm, or with 20%.

Unfavorable agro climatic phenomena. The major unfavorable agro climatic factors which influence negative the agriculture of Moldova constitute late spring frosts, droughts and droughts winds, high temperatures of the air, strong winds, low temperatures in winters and others.

Drought phenomena. In Moldova the most part of the agricultural areas is situated in the zone with insufficient humidity conditions. The assessment of special-temporarily changes of the dryness conditions of the territory of the country was determined by various indicators of humidity. In order to characterize the humidity conditions of the warm season, the Hydrotermical coefficient (HC) by Seleaninov has been used. The analysis of HC calculations permitted to identify that fact that during 1891 - 2005 in Northern part of the country droughts were observed in medium once during 10 years, in Central part were observed in medium once during 6-7 years. Drought conditions can decrease the agriculture crops yields by 50% and more. During the last decades, the droughts phenomena occurred more frequently and become more intensive, that

fact probably is linked with the climate changes occurred. Thus, in the period from 1990 to 2003 at the territory of the country the droughts of various intensity observed in 8 years (1990, 1992, 1994, 1996, 2000, 2001, 2003). In 1990, 1992, 2003 drought season occurred during the whole vegetation period (IV-IX), in the other years - was observed in summer season. During these years there were observed winters with a low snow conditions and decreasing of temperature of air below minus 15C. Such weather conditions lie to the frozening of cultivated grapes varieties, the quality of the winter wheat crops, and decreasing of yields. During the winter 2002-2003 and spring 2003 there were observed very unfavorable conditions for growing, development and yields forming of winter grains plants. The winter with low snow conditions, low temperatures of air during the winter period and drought conditions in spring due to the fact that a record low yield of winter wheat have been obtained that year, about 7 000kg/ha (according the data of the Ministry of Agriculture). The same low level of the winter wheat yield has been observed in 1944. The tendency of decreasing of productivity of agricultural crops has been noted during last 10-13 years . The most low yields of winter wheat have been observed during the 5 years (1994, 1996, 1999, 2000, 2003), maize - during 7 years (except 2003). This fact is linked with drought conditions, observed for this period, as well as the other conditions, as inappropriate agro technical measures, lack of irrigation etc., that conduct to decreasing of the resistance of agriculture crops.

Frosts conduct to the decreasing of vegetation period, provoke the death of sapling of agriculture plants, leguminous plants and tobacco, flowers of fruit trees etc. In some years the negative effect produced by spring frosts is about 100%.

A specific character of temperate springs is the consequent appearance of very warm and cold periods. During the temperate springs there were observed temperate flowering of stone fruits to 10-14 days (apricot, pears growing usually required 88-130C of effective warmth).

Low negative air temperatures (minus 20C and lower) produce important influence on winter cereals and multiannual plants. The low temperatures provoke decreasing of density of winter grains till 10-30%, and once in 20 years - till 50%. Such negative consequences have been noted in winter 2002-2003.

Conclusions. The assessment of changes of agro climatic resources provided above could be used by decision-makers in agriculture and other branches of national economy that are using the climate data. The observed tendencies of changes of agroclimatic resources could be useful for preparing of land management strategies and policies, in the fields of environmental protection and health care, for elaboration of adaptive measures to the conditions of climate changes, preparing of normative acts

and standards, etc.