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Change of meteorological values in the autumn of Republic of Karakalpakstan and Khorezm region

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ABSTRACT The study examined the average, maximum and minimum values of air temperature, in autumn, based on meteorological station data in the irrigated areas of the of Quyi Amudarya district. The average air temperature and of precipitation days change was analyzed about the in autumn.

KEY WORDS. station, data, average, maximal, minimal, temperature, precipitation, agrometeorology

I.INTRODUCTION

The study of the thermal state of the region due to climate change at the present time is of practical importance in the selection of crop varieties.
One of the most important agro-technical measures for fallow crops is the period of planting season. Before planting, it is important to know the climate of the region and its future transformation. One of the pressing issues is the knowledge of changes in air temperature and rainfall in meteorological stations located in these areas.
In this regard, we will examine the study of changes in meteorological temperatures in the Lower Amudarya District (Karakalpakstan and Khorezm region) in the autumn.

II. RELATED WORK

As it is known, for any independent state, food security and supply of the population with sustainable food products remain an important issue. As you know, the influence of meteorological temperatures (air temperature, precipitation) in the formation of agricultural crops growth, development and productivity is of great importance. Many researchers in these fields have conducted research [2, 3, 5, 7, 10, 11].
One of the agricultural crops is one of the most important measures to determine the timing of sowing of cereal crops, which determines the fate of the harvest next year. The sowing of winter wheat seeds in each region provides for proper timber and climatic conditions, timely harvesting, good preparation for entry to the winter tense, moderate wintering and high yields [10]. Republic of Uzbekistan is composed of deserts, plains, mountain and foothills. In the 1960 y, L.N. Babushkin conducted geographical research into the distribution of thermal resources in the region by different counties.

III.THE MAIN GOALS AND OBJECTIVES OF THIS WORK

For autumn cereals, the purpose of the study of temperature fluctuations (t_{aver}, t_{max}, t_{min}) in Nukus and Urgench stations, precipitation days and their long-term values and climate change is one of the objectives of the study of their values and future changes.

IV.MATERIALS AND METHODS

The Uzhydromet archive used data from meteorological stations in the Republic of Karakalpakstan (Nukus) and Khorezm Province (Urgench). The calculations are based on sources [4, 12].

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V.RESULTS AND DISCUSSION

The meteorological station in the Uzhydromet network monitors the phenological phases of autumn crops in a single way (Figure 1).
As can be seen from Figure 1, the autumn winter season begins from the sowing to the end of the vegetation until the end of the vegetation and the full vegetation period (full recovery).
The growth and development of the winter wheat occurs at 2-3°C to 36-40°C. For the initiation of biochemical and physiological processes in the seed, the temperature should be 1-2°C.

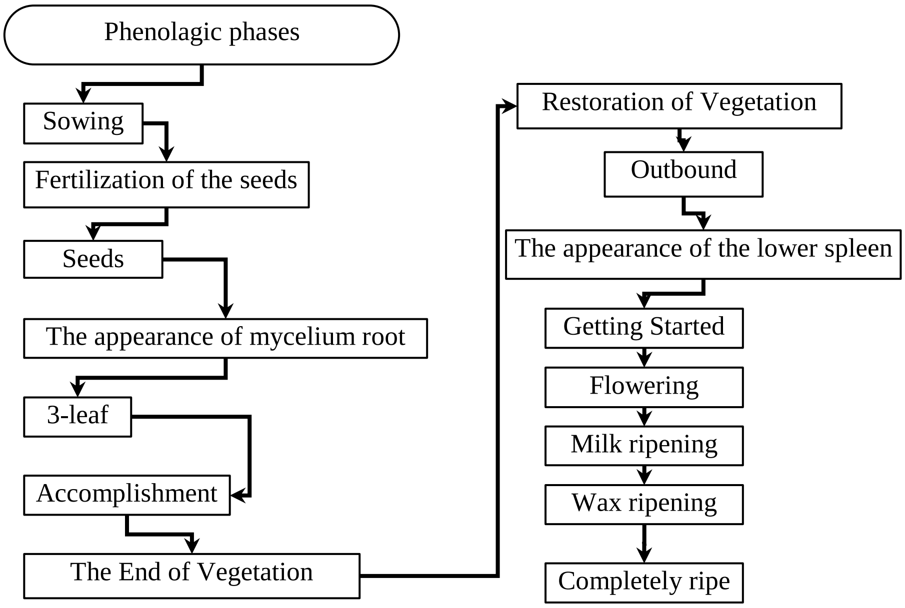

Figure 1. Phenological Phases of Crops

In northern regions, when the air temperature falls to a constant drop of 5°C, the active vegetation of the plant is diminished, and the vegetative state of the plant begins [8]. Here the termination of vegetation (autumn tense cycle) is the case when the average air temperature falls below 2-3°C.
In the Lower Amudarya District, the northern part of the country (the Republic of Karakalpakstan and Khorezm region), the sharp fluctuations of the air temperature are characterized by low rainfall. The Urgench and Nukus metrological stations located in the district were compared with the years 1991-2017 data on the change in the autumn temperature (average, absolute maximum, absolute minimum) values for the irrigated area using the data (Figure. 2).
If we take the trend line in Figure 2, average and absolute maximum and minimum temperatures in October and November have slightly decreased since average and minimum air temperatures have been rising in September. These changes are the main reason why air masses enter the region from the north.
In assessing agro-meteorological services to agriculture and the assessment of the phases of plant phases, it is important to know the values of air temperature and precipitation for five days (penta).
Therefore, the following table presents the long-term values of five days on the basis of the data collected from 1991 to 2017.

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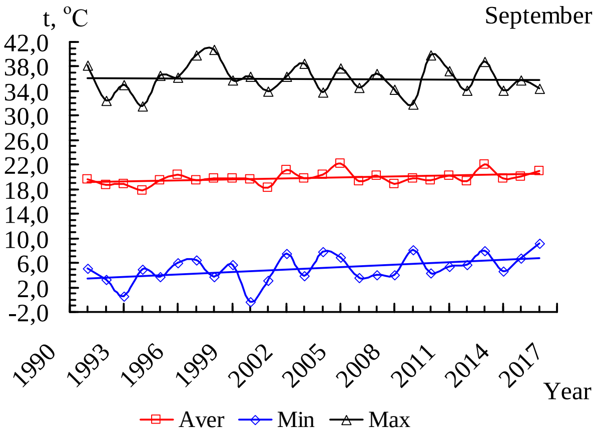

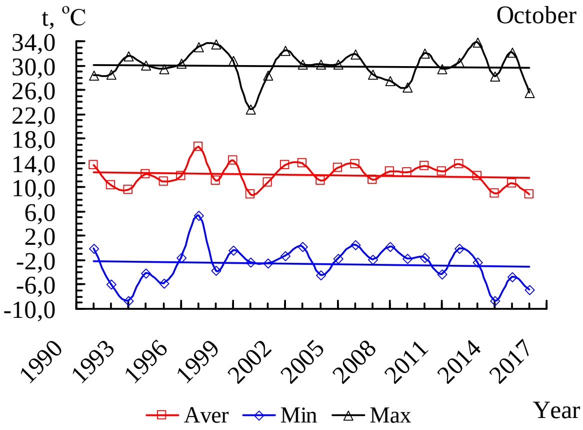

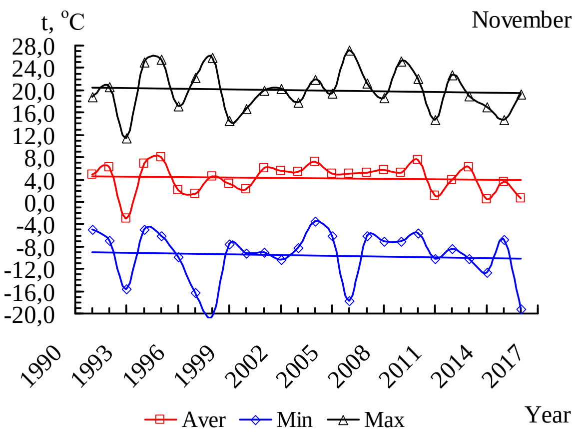

Figure 2. Interim change of average, maximum and minimum values of air temperature in the Lower Amudarya District

Table 1 shows that the average air temperature over the first decade by the stations is as follows: average air temperature in Nukus - September – 7,0°C, October – 6,5°C, November – 8,1°C , In Urgench - September - 5,8°C, October - 6,3°C, November - 7,7°C; Absolute maximum air temperature in Nukus - September - 7.0°C, October - 7.1°C, November – 9,2°C, Urgench - September – 6,0°C, October – 7,0°C, November – 8,9°C; absolute minimum air temperature in Nukus - September – 6,3°C, October – 5,2°C, November – 7,3°C, Urgench - September – 5,2°C, October – 5,2°C, November – 6,8°C. The end of the growing season corresponds to the fifth day of November.

Table 1

In Nukus and Urgench meteorological stations, in September-November, five-day air temperature average, maximum and minimum values (1991-2017)

Station	Months	Pentade					
		1	2	3	4	5	6
		dates					
		1-5	6-10	11-15	16-20	21-25	26-30(31)
Average air temperature							
Nukus	IX	23,5	22,4	21,0	19,5	18,1	16,5
	X	15,7	13,5	12,9	11,4	9,7	9,2
	XI	8,4	5,6	4,3	2,9	1,7	0,3
Urgench	IX	22,4	21,3	20,3	18,8	17,6	16,6
	X	15,7	13,5	12,6	11,5	10,0	9,4
	XI	8,9	6,5	5,1	3,8	2,5	1,2
Maximum air temperature							

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Nukus	IX	31,5	30,3	28,7	27,4	26,3	24,5
	X	23,5	21,5	21	19,4	17,2	16,4
	XI	14,7	12,0	10,4	8,9	7,7	5,5
Urgench	IX	30,8	29,9	28,6	27,1	26,0	24,8
	X	24,2	21,5	21,1	19,8	17,8	17,2
	XI	15,5	13,0	11,4	9,8	8,5	6,6
Minimum air temperature							
Nukus	IX	15,3	14,3	13,1	11,7	10,2	9,0
	X	8,3	6,5	5,7	4,3	3,2	3,1
	XI	3,2	0,3	-0,4	-1,9	-3,1	-4,1
Urgench	IX	14,5	13,3	12,8	11,2	10,1	9,3
	X	8,5	6,8	5,6	4,8	3,7	3,3
	XI	3,7	1,3	0,3	-0,8	-2,0	-3,1

Using this information in the future, it is possible to calculate the effective temperatures required for cereal crops (winter wheat).

Table 2 shows the precipitation levels in September and November at Nukus and Urgench meteorological stations. If we look at Table 2, the change in precipitation for five days is as follows: average - Nukus station – 5,3 mm (sixth day) in September, 5,4 mm in October (fourth), 4,7 mm in November (in the third five days), Urgench station – 9,0 mm (sixth five days), 3,4 mm in October (third five days) and 5,6 mm (sixth five days) in November; maximum - Nukus – 30,2 mm (sixth five days) in September, 23,7 mm in October (in the third five days), November 18,0 mm (third and fourth five days), Urgench station – 13,6 mm (fifth five daily), 13,2 mm in October (fourth five days) and November 18,6 mm (second five days); minimal values were 0,3-2,2 mm at stations under consideration. In general, the amount of precipitation is not uniformly distributed across stations.

Table 2
Amount of precipitation in September and November at Nukus and Urgench Meteorological Stations (1991-2017 yy.)

Station	Months	Pentade					
		1	2	3	4	5	6
		dates					
		1-5	6-10	11-15	16-20	21-25	26-30(31)
Average							
Nukus	IX	0,6	1,4	1,7	0,7	2,4	5,3
	X	1,8	1,2	3,0	5,4	4,6	2,3
	XI	3,7	1,6	4,7	4,2	4,0	2,0
Urgench	IX	0,9	2,1	1,5	1,9	3,8	9,0
	X	3,3	2,0	3,4	3,1	3,0	1,9
	XI	2,3	3,1	3,8	2,5	2,0	5,6
Maximum							
Nukus	IX	0,7	3,2	1,9	0,8	18,7	30,2
	X	5,4	3,6	7,4	23,7	10,5	20,1
	XI	17,6	7,9	18,0	18,0	7,6	10,1
Urgench	IX	1,2	3,6	2,3	4,1	13,6	9,0
	X	7,6	3,4	7,2	13,2	5,8	11,3
	XI	11,2	18,6	13,4	6,7	11,4	7,8
Minimum							
Nukus	IX	0,4	0,4	1,4	0,1	0,4	0,5
	X	0,4	0,3	0,6	0,3	0,3	0,3

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	XI	0,3	0,3	0,5	0,3	0,3	0,2
Urgench	IX	0,6	0,6	0,5	0,5	0,7	0,0
	X	0,3	0,6	0,4	0,6	0,9	0,3
	XI	0,3	0,6	0,6	0,3	0,3	2,2

The climate of the earth has changed over the centuries. As a result of these changes, the climate of a geographical area has changed to a warmer or warmer, more or less humid climate.

Climate is the ultimate measure of crop yields and livestock productivity. Therefore, in order to use the climatic capacities of the regions, it is important to first investigate the climate, identify the importance of agriculture and reduce the risk of adverse weather conditions.

According to the recommendation of the WMO Climate Practice Guidelines, if at least 80% of the data for the year is available, the standard climatic standard or base value should be calculated. This means you can calculate the norm or average values for the months when there is at least 24 years of data available for 30 years. Climatic Principles have two main purposes: the current climate trend in the given region and the climatic conditions that can be compared to the given time in the given region (or region) [12]. Research has also been conducted by many researchers on this issue [6, 9, 11].

Figure 3 and 4 show the average temperature and rainfall volatility in the baseline period (1961-1990) followed by the period 1991-2017 (here: 1-3 (September), 4-6 (October), 7-9 (November) day).

As can be seen from Figure 3, average air temperature during the current climate climbed in October and early in November, but in the third decade of November the temperature dropped.

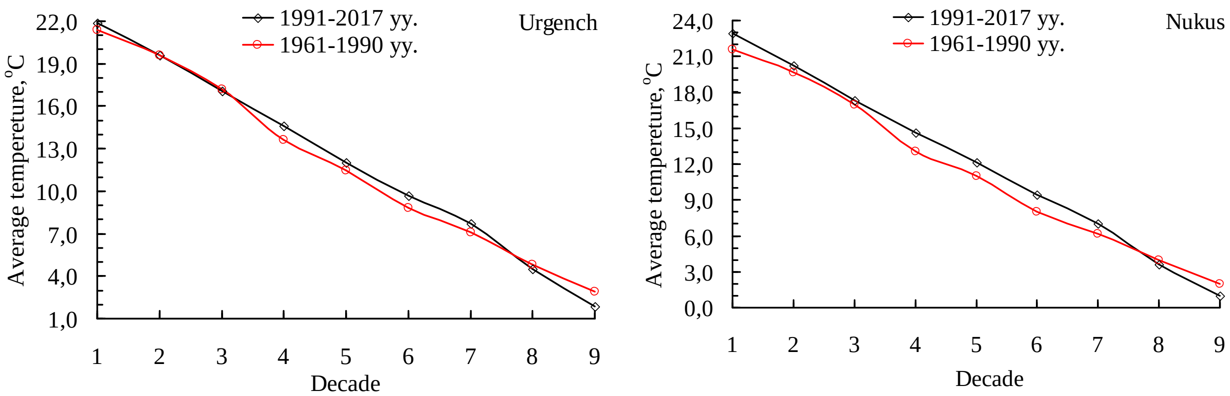

Figure 3. The average temperature in the Urgench and Nukus stations
during the period (1961-1990), followed by the period 1991-2017

Indicates that the amount of precipitation in the fall has increased over the current period in the current climate period (Figure 4).

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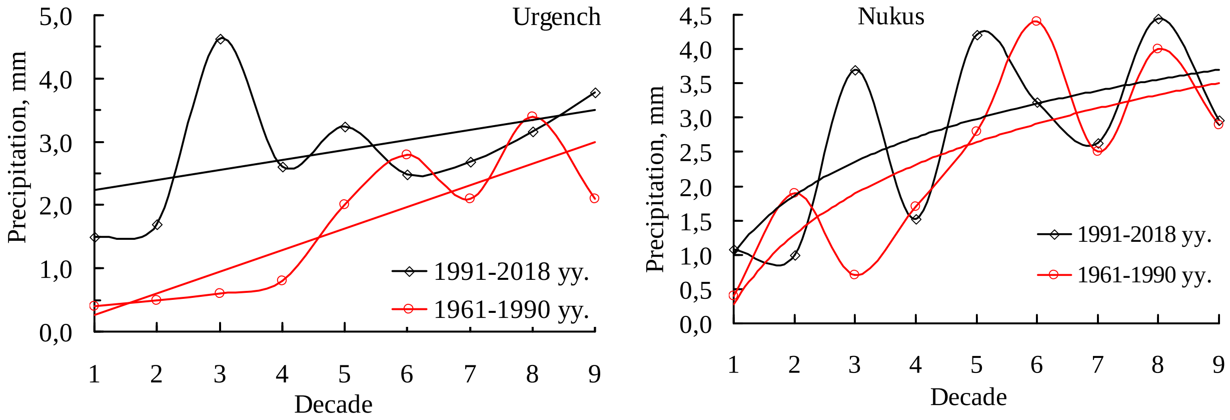


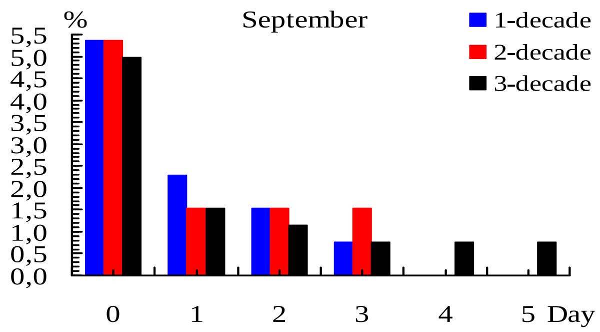
Figure 4. The precipitation change over time in the Urgench and Nukus stations
during the period (1961-1990), followed by the period 1991-2018

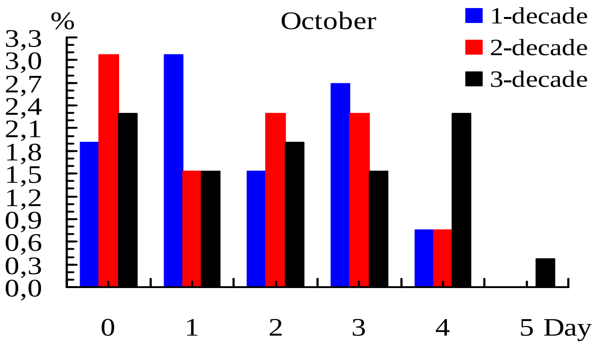
Increasing the amount of precipitation in the region as a result of climate change results in a certain degree of moisture, which in turn will save water resources.

One of the most important issues is the analysis of repeatability and duration of the synoptic processes in the Central Asian region, which causes changes in air temperature and precipitation. Annual change of precipitation also depends on atmospheric circulation and local natural-geographical conditions. Climate elements are also calculated as the number of days with precipitation in months or years. Therefore, we consider the distribution of precipitation in Nukus and Urgench stations during the period of 1991-2017 (September 5-6).

As Figure 5 shows, the number of precipitation days in Nukus station over decades (decaded) in September is expected to be 1-3 days (0,5-1,5%) in September and 1-4 days in October 0,6-1,8%) and 1-7 days in November (0,3-1,5%). In October and November the number of sunny days has increased.

Figure 6 shows the number of precipitation days in the Urgench station over the decades The average number of days in September was September 1-2 days (2,5%), 3 days in October (1,5-2%), and in November amounted to 1-7 days (0,5-2%).





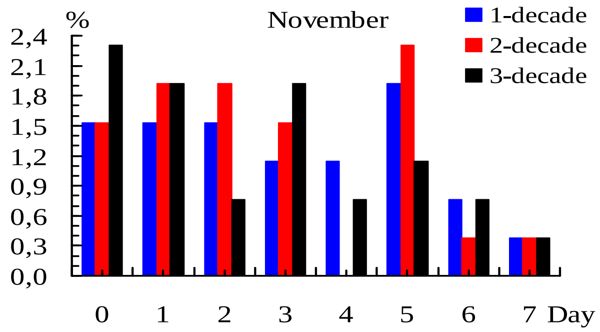


Figure 5. At Nukus station the number of days with rainy days the diagram of the distribution by decadence

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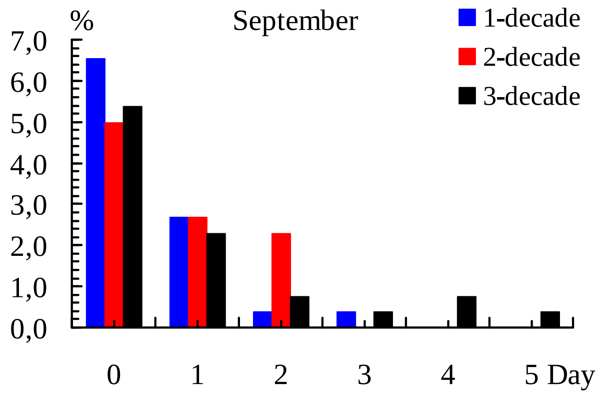

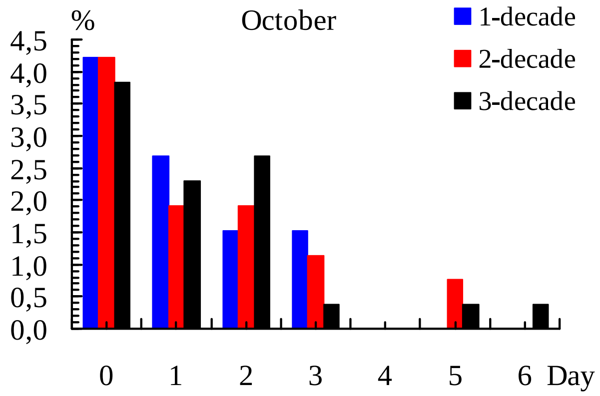

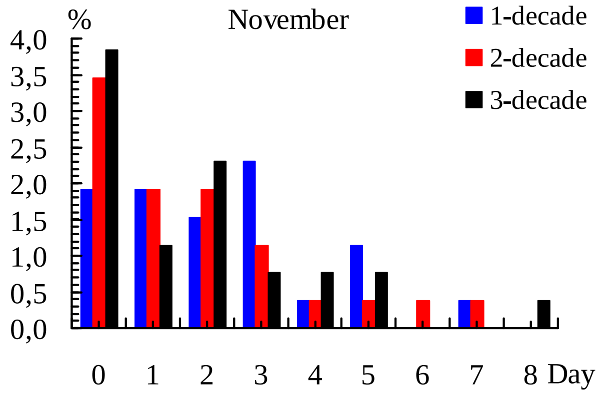

Figure 6. At Urgench station the number of days with rainy days the diagram of the distribution by decadence

VI.CONCLUSION

In summary, we note that the mean and minimum temperature in the district in September slightly decreased in October and November, with the average, absolute maximum and minimum temperatures slightly lower.
The end of the vegetation period falls on the fifth day of November. Using this information in the future, it is possible to calculate the effective temperatures required for cereal crops (winter wheat).
In general, the amount of precipitation is not uniformly distributed across stations. The reason for this is also the location of the stations. This table data can be used to determine the amount of precipitation in the region and to carry out agro technical measures.
In the current climate, average air temperature increased in October and early in November, but in the third decade of November the temperature dropped.
In the autumn, the amount of precipitation increased in the current climate period relative to the base period
Generally, the Nukus station has a lot of sunny days than the Urgench station.
This information can be used in agricultural agrometeorological services and for students in the learning process.
Based on the above, it is necessary to conduct research in the following main areas for grain crops:
- change in the value of meteorological values from planting to cooking on the territory of the republic;
- Hazardous meteorological phenomena during development;
- find suitable date of sowing by region;
- the aggregate of temperatures necessary for the transformation of the phenolic phases of the sown varieties in the regions;
- The influence of water temperature and hydro-ecological state on crop development during irrigation;
- assessment of agrometeorological conditions in the formation of productivity elements;
- Prognostication of productivity elements and productivity;
- Agroclimatic cards of irrigated and non-irrigated lands.

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