CONSIDERATIONS ON GALATI COUNTY PEDO-CLIMATICAL CONDITIONS AND THEIR INFLUENCE ON AGRICULTURAL DEVELOPMENT

Camelia-Viorela NICOLAU [1], Benedicta DROBOTĂ [1]

[1] University of Agricultural Sciences and Veterinary Medicine of Iaşi

Abstract

Romanian rural economy dominated by agriculture in large part, is still poorly integrated in the market economy. Favourable geographical conditions, topography, climate, fertile soils, skilled labour, can make from Romanian agriculture an attractive and profitable area of activity. As an economic sector, agriculture occupies in the county of Galati, a leading place due to the rich rivers, which allows the practice of an intensive agriculture.
This is due also from the great potential of Galati County, which, farmers, supported by central and local authorities, are trying to fully exploit it. The county, by its morphological features, provides favourable conditions for various agricultural activities. There are presented also some negative phenomena and processes as soil erosion, landslides, areas with salty soil, sand or flood soils that require specific actions.
Climate changes in recent years are affecting many sectors of the economy. Agriculture is one of the area's most exposed because of its dependence on weather conditions. Extreme weather events more frequent (such as floods, heat waves and droughts) have negative impact on crop yields, increase the distribution and intensity of disease, and also weed growth because of temperatures and higher humidity, submission periods of flowering trees, longer wine season, changes in other natural cycles of plants, changes in the timing of agricultural operations, etc.

Key words: climate, agriculture, agricultural potential.

In the last century, temperature in Europe increased by almost 1 ° C faster than the world average. The largest increase occurred in the past 50 years. Although there appears to be dramatic, this trend has had a + ignificant impact on many physical and biological systems (water, habitat, health), which are becoming increasingly fragile. Climatic conditions became variable. Rain and snowfall have increased significantly in northern Europe, causing more frequent floods, while rainfall in southern Europe have fallen significantly and droughts are more frequent. Temperatures become extreme. Economic losses caused by extreme weather events have increased over the past decades.

The agricultural sector has suffered severely due to drought, soil erosion, winds, storms and heavy rains, hail, late spring frosts and floods.

Climate instability is one of the main causes of instability of agricultural production in recent years in Galati county.

MATERIAL AND METHOD

The paper is based on a bibliographic study on pedo-climatic conditions in the county of Galati and their influence on agricultural development. Was analyzed: geographical location, climate, air temperature, frost, relative humidity, cloudiness and sunshine duration, rainfall, hydrological and hydrographic network, the main soil types and their influence on the agricultural sector of Galati County.

RESULTS AND DISCUSSIONS

Located at the crossroads of ancient and important trade routes at the confluence of the Danube and the major rivers of Moldova, Siret and Prut, Galati County has an important role in economic and socio-cultural (Galati City.Monograph album, 1999) *(fig. 1).*

Figure 1 **The location of Galati county**

The geographical position is characterized by the contact area between the southern hills of Moldova Plain, Romanian Plain and Măcin ground.

Galati bears in the landscape the imprint of European geographic entities influence, who interfere in the land of Romania.

The vegetation is forest steppe on hills and plain of Tutova and Covurlui and in Tecuci and Covurlui Plain a steppe vegetation.

Climate

Galati county territory belongs entirely to the continental climate sector (central and southern part totaling more than 90% of the area, falls within the climate plain and the northern tip representing 10% of the land, the land of hills climates).

In both climate sectors is very hot in summers and dry and cold in winters, marked by strong storms, and also the frequent interruptions caused by hot and humid air in S and SV that cause intervals with heating and snow melting. Against the backdrop of overall climate, the plains Siret, Prut and Danube bring change in the main meteorological factors, changes that lead to a specific topoclimatic meadow, wetter and cooler in the summer and wetter and rather cold in winter. General circulation of the atmosphere has the main features relatively high frequency of slow air mass moving horizontally of temperate – oceanic air of V and NW (especially in hot semester), also higher frequency of air mass moving horizontally of temperate – continental air from NE and E (especially in cold season) and uncommon arctic air from N and tropical maritime air from SW and S.

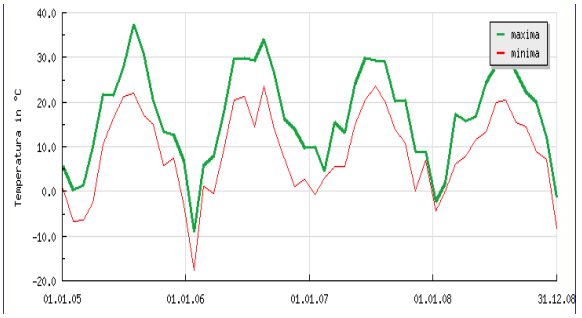
Compared with neighboring territory to the south (Braila county), Galati County has harsher climate characterized by hot and dry summers and cold winters with frequent blizzards.

The wind is determined by atmospheric general circulation features (the different barrel crosses systems) and the active surface features.

In Galati County, the average annual speed rates range between 4-5 m / s, higher, meeting in lower Siret Plain, of 5-6 m / s.

Air temperature

Temperature regime is determined by the synoptic features of each season. Summer maximum temperatures recorded over 30-35 ° C, especially in July and in winter, mainly in January, low temperatures, often attracting -20 ° C. Annual average temperatures are higher in the southern part of the county, 10.5 ° C at Galati, and smaller in the rest of, 9.8 ° C in Tecuci (*fig. 2*).



Source: www.weatherundeground.com

Figure 2 **Multianual temperature in Galaţi County**

Frost

Represent a temperature decrease with a value equal or below the freezing point of water (0°C), the overall transformation of water into ice.

Frosts can occur in three different periods: winter, autumn and spring.

Winter frosts called 'black frost' cause generally less damage to agriculture, as occurs in a dormant period. Nevertheless, these frosts have a sensible action on vegetation when a period of several days, the values fall below a threshold temperature lowered (eg. -15 ° C, for grapes).

Frosts of autumn interrupt the fruit trees and vines vegetation, conditional the harvest of corn or causes damage to fruit trees.

Relative humidity, cloudiness and sunshine duration

In Galati County, relative humidity is about 69%.

Sunshine duration and its territorial distribution is closely correlated with nebulosity distribution system, in particular the lower (upper and the middle clouds, vertically developed and less transparent due to their composition of particles of ice, let go some bright sunlight).

Galaţi County enjoys 2000-2510 hours of sunshine.

Rainfall

Rainfall totals of the lowest values in the country. The average annual rainfall in the county of Galati are approx. 400-500 liters per square meter.

Most precipitation falls between May 1 and October 15.

Aridity index (R) is defined as the ratio between the amount of annual precipitation and potential evapotranspiration. From this perspective, Galati county falls within the area of the aridity index from 0.50 to 0.65, indicating a medium to pronounced one.

The hydrography and hydrology

Galaţi County has a rich hydrographic network, which includes the Danube, Prut and Siret rivers with tributaries (Barlad, Elk and Horincea) and Lake Brates.

Tributary river network belongs to the Danube river Siret and Prut.

Rivers in Galati county region fits the type of stressed continental. Specific of Moldovan hills and plateaus, they flow predominantly in spring and summer season, high water in spring and floods in summer and autumn.Danube River, flowing over a distance of 22 km and collects the waters of rivers Siret and Prut. Siret River has an important tributary Barlad, which in turn collects the Corozel. Prut tributaries are Elan and Horincea. Chineja creek flows into Lake Brates.

Among the most important standing waters is Lake Brates a - area of 74 km2.

Galati County river system - consisting of the Lower Siret River (the main tributaries: Bârlad Geru and Suhu), Prut (the main tributaries: Elan-lower basin, and Chineja Liscov) and the Danube basin (155 miles from the river Siret and up to 134 miles – from the river Prut), is part of the whole, a hydro-economic profile of the complex, which includes power supply for urban centers and rural accumulation irrigation measures anti-erosion, flood protection works and drainage. These water courses, together with their tributaries, have created a network length of 1524 km river codified (of which 110 km border state - the Prut river), with an area of 4465 Km.p. in the three river basins: Danube, Siret and Prut (Memorandum presenting the county of Galati, 2010).

Main soil types

By its position from outside the Carpathian arch, Galati County occupies interpenetration zone edge of physical-geographical provinces, Eastern European, South European and Central European part, which faithfully reflects both the climatic conditions, the coating plant and soils and the geological structure of the relief. The latter mellowed commanding heights of between 310 m in north and 5-10 m in south. The region itself has a fragmented tabular landscape of higher in the north and poorer in south, distinguished by elevation, location and features of relief, five geomorphological units: Covurlui Plateau, Plain Tecuci, Covur Plain, Meadow of Lower Siret and Meadow of Lower Prut. Covur Plateau occupies most part of the county, with two subunits: Covur hills and plain Covur. The hills dominate the sculpture landscape, and an accumulation one in the plain. Tecuci Plain and Siret Plain is poorly fragmented landscape, composed of alluvial deposits, predominantly with sand and clays.

Prevailing soils in the territory of the Galati County area are zonal one, belonging to chernozem types, alongside erodisoil, faeozems, regosols, psamosolurile and of the azonal ones we meet aluvisolurile and gleysols.

Chernozems with subtypes calcaric and cambic occupies 68% of the county, have a relatively high fertility, but is weakened by low amounts of precipitation. Processes are affected by soil erosion from poor to highly eroded.

Erodisoils occupies 5.7% of soils surface, are generally occupied by low productive grassland affected by strong erosion processes, are soils devoid of vegetation and has a poorly developed vegetation.

Faeozems found in the north of the county occupies 4.6% of surface soil quality are less favorable than chernozems suitable for orchards, vineyards, pastures.

Psamosoils occupies 1.3% - are found in sandy soils of Tecuci Plain,has a low productivity and require improvement.

Regosols occupies 1.2% of the county, found on slopes, on land with erosion and landslides are poorly productive filled with pasture poorly developed.

Aluvisoils occupies 16% of the county, are found in flowing water meadows in the county, soil fertility is good, but varies according to texture, groundwater level, the processes of salinization, the gleyzation.

Gleysols occupies 3.1% of the county, found in areas where groundwater is at 1.5-2 m, are affected by gleyzation processes, have low fertility due to excess water. To improve the quality is necessary the drainage works.

Climate change affects global agriculture. Experts believe that even small increase in global warming will cause greater yield variability.

Most climate change on agriculture are derived from water. Lack of water has a major impact on agricultural production. Agriculture needs to improve water use efficiency and reduce losses.

Side effects are also anticipated and likely increase the distribution and intensity of diseases, weed growth, also because of higher temperatures and humidity.

The impact of weather changes can already be seen. Many effects are observed: the advance of periods of flowering trees, vineyards stretch, the length of other natural cycles of plants changes.

Restriction of areas favorable for agriculture is due to the increasing frequency and intensity of extreme events caused by global warming,

particularly droughts and floods.Some aspects of climate change as warmer temperatures, increased photosynthesis due to the higher concentration of CO_2 in the air and longer growing seasons may have moderate positive effects on productivity of arable crops in certain areas, at least until mid-century. A higher heat will be increasingly more damaging, because plant growth and yield are subject to temperature thresholds related to key reproductive stages. Vegetative cycle acceleration may have negative effects on grain filling and quality.

Extreme weather conditions such as heat waves and droughts, can seriously affect production, especially during critical phases of crop growth.

Vegetable production is highly dependent on the availability of water is affected by temperatures fall even with very little outside the optimum limits, which makes this type of production particularly vulnerable to climate change.

Extreme events are a particular risk for **perennial crops**, as they may affect production capacity over several years.

Many trees are susceptible to spring frosts during flowering, and winter temperature has a significant role in productivity.

Impacts on **wine** include a higher risk of frost, reducing the ripening period, water stress, which can be very damaging in the stage of maturation and change of situation related to pests and diseases.

Drier weather and warmer weather will affect activities in different ways the **livestock**, with implications for health and welfare. Warming and extreme events, such as short periods of heat will have direct impacts on health and animal productivity growth and reproduction. There will also be indirect effects due to changes in the productivity of pastures and fodder crops and spread of animal diseases.

Profound negative impacts could affect the extensive grazing systems directly dependent on climatic conditions to ensure food and shelter (EU agriculture - taking the challenge of climate change, 2008).

CONCLUSIONS

Galati county territory, by its morphological features, provides favorable conditions for various agricultural activities. Are presented also some negative phenomena and processes as soil erosion, landslides, areas with salty soils, sandy or subject to floods and droughts, which require specific action.

As an economic sector, agriculture occupies a prominent place within the county due to rich network of rivers that cross the County and is favorable to practice an intensive agriculture. This is due also to the great potential of Galati County, which, farmers, supported by central and local authorities, it can fully exploit it.

The effects in some years of bad weather conditions can threaten food supplies, causing market price volatility and increased risk for farmers in terms of revenue.

To cope with climate change, farmers need to adapt their technology to a higher recovery of available resources (adaptation periods of sowing, cultivation of hybrids with high resistance to stress factors, agro-technical measures to maintain water in soil in drought periods, protect orchards against frost damage, etc.).

In the livestock sector is important to introduce animal breed more tolerant to heat, feed ration adjustment to existing stressors and improving ventilation and cooling systems of housing.

Particular importance is to inform farmers on climate risks and adaptation of existing solutions to them (crop insurance program, investment in irrigation sector).

To reduce risk at farm level, some measures can be taken to diversify the plant species that will be planted, providing feed stocks, seeds, providing alternative sources of income, etc.

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