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Analysis of climate factors for the development of greenhouses in Eastern Blacksea Region

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Abstract

Eastern Blacksea Region is one of the less developed regions of Turkey in agriculture. That is why greenhouses are incited as an alternative income source for the region. In this study, aiming to evaluate the suitability of the climate conditions for greenhouses, heating and ventilation requirements for initially proposed two model greenhouses were calculated based on multi-years climate data. Climate parameters of region provinces were also evaluated and they were compared with climate characteristics of Samsun Province, where there were intensive greenhouse practices. As a result, it was determined that coastal provinces of the region had significant similarities with Samsun Province and they were more suitable than the inner provinces for greenhouse practices. Depending on the evaluations carried out, advantages and disadvantages of the region for greenhouse practices were determined and recommendations were made to regional producers.

Keywords: Greenhouse; Climate analysis; Eastern Blacksea Region; Turkey

1. Introduction

A never-ending food demand of humans to maintain their lives and their desires to benefit from fresh vegetables during the entire seasons of the year sparks up the development of greenhouse practices. Greenhouse practices are carried out in both northern countries with cold climates and in Middle Eastern countries like Israel, Saudi Arabia with hot climates. Greenhouse practices are also widespread in Mediterranean coastal countries with available ecological conditions, in the USA and Japan. Under-cover production practices have recently widespread in Asian countries. Total under-cover area in Chine by the year 2002 is about 1,963,000 ha [1]. Total under-cover area in Mediterranean countries is more than 300,000 ha and area of greenhouse and high-tunnel systems is about 170,000 ha [2]. Among these countries, Turkey has the second place after Egypt in low-rise tunnel systems and has the third place after Spain and Italy in greenhouses [3].

Turkey is among the countries with intensive greenhouse practices due to available ecological conditions. Greenhouse practices are especially well developed in coastal regions with temperate climate conditions [4]. Beside the Mediterranean coastal line, greenhouse practices are also expanded to Aegean, Marmara, Blacksea and GAP regions. However, when the early-vegetable production is taken into consideration, climate characteristics are the most critical issues specifying the availability of the region for greenhouse practices. Advantage of greenhouse practices in Blacksea Region is the fact that they do not need cooling practices during spring and summer like the ones in the Mediterranean coastal line. This advantage provides a significant economical gaining for regional greenhouse practices [5].

Eastern Blacksea Region covering the provinces of Artvin, Bayburt, Giresun, Gümüşhane, Ordu, Rize and Trabzon is one of the less-developed regions of Turkey. This region, located along the path of Silk Road, had reached significant riches during the periods with highly

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developed international trade practices but lost its significance after 1917. Migrations have arisen from the region due to low-income levels and limited employment opportunities. Considering the available potential of the region, Turkey has prepared a regional development project (DOKAP—Eastern Blacksea Regional Development Project) to increase the development level of the region. Among the regional development strategies in this project, development of agriculture and agriculture-dependent industries have a significant place. Among the economical development objectives, there is project of diversification and intensification of rural economy and inciting greenhouse practices [6].

Climate conditions are the most important factors affecting the production economy in greenhouse practices. In greenhouse areas, solar radiation rates in fall, winter and spring seasons should be high, winters should be temperate and humidity should be at low levels. Also, energy costs should be low, irrigation water with low levels of salinity should be used, means of transportation should be developed and there should be readily available markets for greenhouse products [4].

In this study, climate parameters for Eastern Blacksea Region Provinces of Artvin, Bayburt, Giresun, Gümüşhane, Ordu, Rize and Trabzon were evaluated and they were compared with climate characteristics of Samsun Province where there are intensive greenhouse practices. Also, advantages and disadvantages of the region for greenhouse practices were determined based on climate, soil, topography and inventory data of the region and by taking agricultural enterprise distribution and social structure of the region into consideration and recommendations were provided to regional producers.

2. Materials and method

2.1. Study area

Eastern Blacksea Region is located in the northeastern part of Turkey. Total surface area of the region is 39,203 km^2 constituting 5% of country surface area. Eastern Blacksea Region is composed of seven provinces as of Ordu, Giresun, Trabzon, Rize and Artvin along the coastal line and Gümüşhane and Bayburt in the inner parts (Fig. 1). Total population of the region is 2.91 million constituting 4.6% of country population. Almost 80% of regional population is massed in coastal line. This massive population is distributed into several settlements along the coastal line. Regional topography limits the construction of a developed transportation infrastructure [6].

The region has limited agricultural lands resources. Most of its land resources are in IV–VI class and rate of available agricultural land resource in total land resources is about 9.8% (3824 km^2). Average enterprise size is significantly lower than average enterprise size 5.9 ha of Turkey. Regional provinces are highly dependent on single-crop cultivation (for instance, tea in Rize, hazelnut in Giresun). Alternative income sources or income-generating activities should be developed to increase the income levels of regional farmers [6].

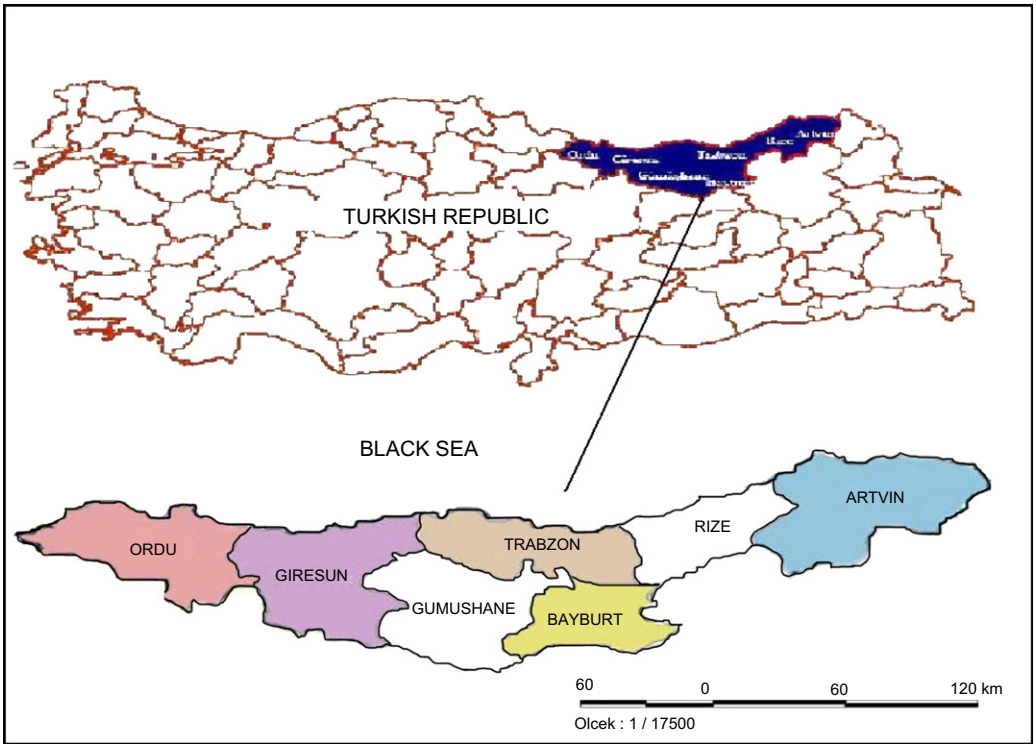

Fig. 1. Study area map.