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SOIL MOISTURE DYNAMIC AT THE RECULTIVATED PLĖGIAI LANDFILL AT LITHUANIA

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В настоящее время захоронение отходов является основным методом утилизации твердых отходов. Эксплуатация современных свалок муниципальных отходов в Литве началась в 2007 году. Все посаженные деревья на рекультивированном полигоне должны быть орошены в течение первых 3 лет после пересадки. Для его технологии рекультивации водный баланс агроэкологических систем является ключевым параметром для большинства физических и физиологических процессов с системой почва – культура – климат. Молодое растение может страдать от нехватки воды, одной из наиболее важных составляющих так называемого посттрансультурного шока. Целью данной статьи является оценка динамики влажности почвы на рекультивированной свалке Плегай.

Abstract

In Lithuania, the transportation of waste to landfills is a major way of eliminating them. However, this is not the safest way taking into account the environmental impact, especially when landfills are installed in inappropriate places without complying with installation and recultivation requirements. According to the data of the Department of Statistics, about 1.2 million tons of municipal solid waste or 361 kilograms per capita were accumulated in Lithuania in 2015. In this work the results of soil moisture dynamic in the recultivated Plėgai landfill are analyzed. The landfill is located in Plėgai village, Šakiai district, Lithuania. The work assessed whether the recultivated landfill was installed in accordance with EU requirements. The scientific hypothesis was put up that after the proper installation of the recultivated landfill, soil moisture in it will be the same as in the nearby natural meadow. The research covered the period from June 2nd, 2016 to September 29th, 2016. In the course of the research period, half of the annual precipitation of the year 2016 fell within 4 months, i.e. 336 mm. The highest rainfall was 119 mm in July, the driest was 46 mm in June. During the period of the research it was established that in the landfill and perennial grass meadow soil moisture reserves varied evenly until the first decade of August, the lowest soil moisture values were fixed on 11-20 days of June, then it was 15.11% in the landfill and 15.3% in the perennial grass meadow.

Introduction

Landfilling is currently a primary method for solid waste disposal. Human activities are inevitably associated with the generation of waste. The operation of modern municipal waste landfills in Lithuania started in 2007. All planted trees at recultivated landfill site should be irrigated for first 3 yeras after transplanting. Landfill cover soils experience large temporal variability in soil temperatures, soil moisture, and CH4 soil gas concentrations. Fort his recultivation technology the water balance of agro ecological systems is a key parameter for most physical and physiological

processes with the system soil–crop–climate. One of the most critical parameters is evapotranspiration (ET); The closed landfills have different soil temperature conditions and plants has lack of absorption capacity in the roots. The young plant may suffer from water stress, one of the most important components of what is known as post-trans-plant shock. No studies on how powerfully such situation influences changes in composition have been undertaken to take into account Lithuanian conditions. The aim of this articlis evaluate the dynamics of soil moisture in a recultivated Plėgai landfill and perennial grass meadow and calculate the total evaporation from Plėgai landfill.

Materials and Methods

The research object is located in Plėgai village, Šakiai district, about 12 km east of Šakiai town. The visual assessment of the landfill has been carried out in the course of its functioning, during the closure works, and after recultivation, i.e. after the formation of the landfill. During the recultivation of the landfill, the coating layers have been checked by means of clearing.Soil moisture was determined by sampling in the landfill and from the perennial grass field adjacent to the landfill site. The layout of the sampling point in the landfill and in the field outside 30 meters in the perennial grass meadow is shown in Fig.1. Soil moisture samples were taken in three replicates. Samples were taken in a 0 to 100 cm layer, every 10 cm. Soil samples were taken by the Izmailovsky type drill. Samples were taken every seven days, from June 2 to September 29. Meteorological data (average daily temperature and precipitation amount) were obtained from the meteorological station located in Kaunas, Ringaudai subdistrict.

Results and Discuccion

The study of the landfill cover was performed by clearing the layers of the landfill to the protected geosynthetic layer. The HDPE tissue was not damaged at the cleared site, there were no signs of bumps that could have damage it or cause other unwanted cracks. The presented data on the installation of the layers in the landfill closure project corresponds to the layers installed in reality, which suggests that the landfill site is properly installed (Fig.1). *Meteorological conditions in the object of research.* During the research period, the average temperature of 4 months was +17.02 °C .The highest daily temperature +32.0 °C was fixed in August (2016-08-09), the lowest average daily temperature was recorded on the 27th of September, at +4.7 °C. In the course of the research period, within 4 months, came half of the annual precipitation – 336 mm. Soil moisture is an important part of the atmospheric water circulation circuit. It is particularly important for crops. Vegetation depends more on the moisture content of the roots than on the amount of precipitation. The moisture content on the former landfill should be close to that of moisture in reclaimed agricultural areas. At the beginning of the observations in June, the soil moisture content was over 26% in both of the studied fields, so the soil moisture in both fields was similar. The soil moisture content of the perennial grass meadow and landfill changed evenly, therefore, the coefficient of correlation between the soil moisture in the landfill and in the meadow was determined. The correlation coefficient r=0.855 has been determined, which indicates that there is a high probability of changes in soil moisture in the landfill too when there is a change in moisture in in the meadow of perennial grasses. It has been determined that the average correlation r=0.482 between precipitates and soil moisture in the landfill is predominant, correlation coefficient between soil moisture in the perennial grass meadow and precipitation r=0.512. T*otal evaporation in the landfill site*. Total evaporation was studied under natural conditions in 2016 from June 1 to September 30. The amount of evaporation during the vegetation period was equivalent to the amount of water used by these plants. After calculating the total evaporation, the maximum values were set in July – 310 mm.

Conclusion

The lowest soil moisture content was fixed in June, it was fixed in 11-20 days, – 15.11% in the landfill and 15.3% in the perennial grassland meadow. In the first ten days of July, soil moisture in the landfill fell to 14.5% and reached its lowest level throughout the observation period. After the 80 mm precipitation the moisture content (during the 3rd decade) rose to 20%. Subsequently, during the entire observation period, soil moisture in the landfill site did not fall below 19.5%.

After the calculation of total evaporation, the highest values were obtained in July at 310 mm, the average evaporation of the research period took place in August and June, an average of 259 millimetres each month. In September, evaporation was the smallest – 180 mm.

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СОСТОЯНИЕ ПИТЬЕВЫХ ВОД РОДНИКОВ В Г. ГРОДНО

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The drinking water quality of some non-centralized sources in Grodno was studied. This water was analyzed by organoleptic, chemical and microbiological indicators. A high content of iron ions were established.

В Республике Беларусь централизованное водоснабжение городов, городских и сельских посёлков и промышленных предприятий базируется на использовании пресных подземных вод [1]. Микробиологическое и химическое загрязнение вод в ряде регионов все еще фигурирует в качестве одной из основных проблем хозяйственно-питьевого водоснабжения. По результатам санитарного надзора за хозяйственно-питьевым водоснабжением в 2015 г. доля