Секция 2 «Природообустройство и водопользование»

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INFLUEANCE OF AGROPERLIT ADDITIVES ON SOIL MOISTURE DYNAMIC

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Многие производители картофеля, капусты и других овощей исчисляются сотнями; по оценкам, потребление картофеля в Литве составляет более 96 кг на душу населения в год. Однако картофель, выращиваемый большинством растениеводческих хозяйств, больше всего страдает от частых естественных засух. Чтобы снизить влияние засухи, фермеры могут установить ирригационные системы или использовать в поле биологические добавки, такие как агроперлит. Целью исследования было определение динамики влажности почвы в мае–августе, когда в почву вносили разное количество агроперлитовых добавок.

Potato is a shallow rooted crop and extremely sensitive to water stress [1,2]. The deficit of water is not practical for commercial potato production [1,3]. Both soil water and temperature have been shown to be in potato plant growth and tuber production [4,5].

In recent years, drought and soaking problems in Lithuania have become more frequent. Potatoes and maize suffer most from natural droughts, as they need moisture the most in July and August [6]. Most researchers say that the highest potato yield can be grown when the soil moisture is 80% of the field moisture capacity (FMC). When the soil is too dry (15–20% FMC) or too moist (up to 90–100% (FMC)), the potato yield is low [7]. In order to avoid droughts, farmers have several options - to install irrigation systems or to use different additives in the fields, which help to increase soil moisture and thus reduce the need for irrigation. Mineral additives potentially influence infiltration rates, density, soil structure, compaction, soil texture, aggregate stability, crust hardness, and evaporation rates.

The aim of the study was to determine the dynamics of soil moisture in May-August, when different amounts - 0.5 cm, 1 cm and 2 cm of biological additives are added to the soil. Soil moisture were measured with TDR 150.

Soil moisture measurements were performed every 10 days at a depth of 0–20 cm, and soil temperature was also recorded with 3 measurements in each test field. Metrological data of the analyzed period were used from the nearest meteorological station at Alytus.

In 2020, the amount of precipitation changed during the research (Figure 1). During the whole period observed in 2020, precipitation was 234 mm and in 2 nd of May the highest precipitation was recorded - 52.8 mm. In this short observed period amount of soil moisture was in the optimal conditions for potato germination. At period 1st and 3rd decades of August felt 34.7 mm and -21.7 mm of precipitation. Another 6 decades was fixed less than 10 mm of precipitation per decade. During this observed period, 77% of all decades were drier than perennials (DNs). Comparing the dynamics of daily average temperatures with the soil temperature, were fixed that from 1st. decade of May to 2nd of August, the soil temperature at the time of measurement (11-12 a.m.) was always in 12-16 degrees higher. Later, this difference becomes evener, because from the beginning of June the daily temperature did not fall below 20 ° C.

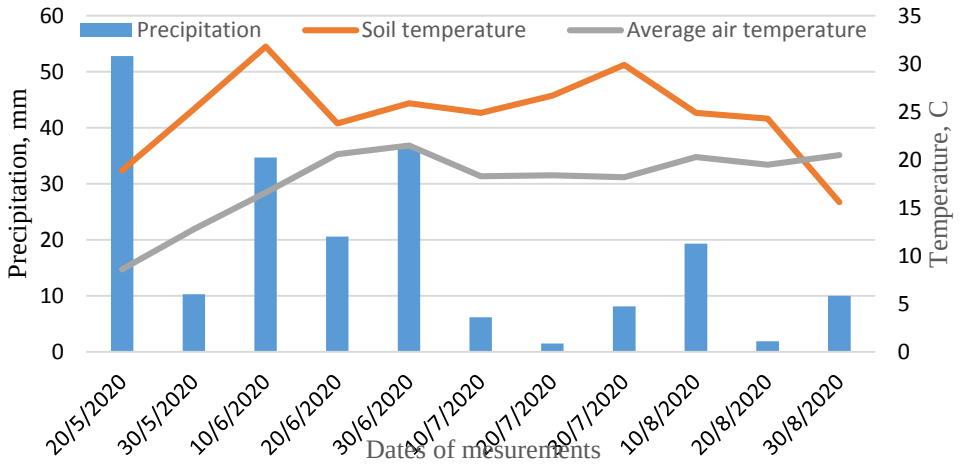

Fig. 1. Dynamic of observing meteorological conditions at Silavotas

Soil moisture measurements were performed at 10-day intervals. Soil moisture dynamics overlap in the same field of study even with different rates of biological additives. However, as might be expected, soil moisture dynamics are mostly influenced by precipitation and air temperature. In experimental fields during the dry period from second decade of July till second decade of August, up to 5% difference in soil moisture dynamics compared to the control fields is observed. The results show that differences between volumetric water content warier from 2.07 % till 3,66 % in experimental fields.

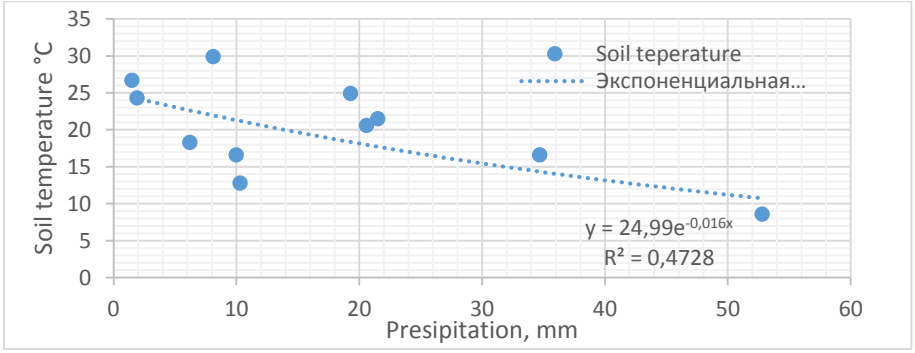

Fig.2. Exponential relationship between soil temperature and precipitation

As climate change has a major impact on farmers 'work schedules, planting and digging deadlines are adjusted. The study found that soil temperature correlates with exponential dependence on precipitation (fig. 2). The correlation coefficient r = 0.69, and when assessing the relationship between soil temperature and ambient temperature, a linear dependence and coefficient of determination R = 0.5649 were found, and the correlation between these two environmental phenomena is very strong at r =0.751.

References

1. Jefferies, R.A., Heilbronn, T.D., 1991. Water stress as a constraint on growth in the potato crop. 1. Model development. Agric. Forest Meteorol. 53, 185–196.
2. Fabeiro, C., Martнn de, S.O.F., de Juan, J.A., 2001. Yield and size of deficit irrigated potatoes. Agric. Water Manag. 48, 255–266.
3. Alva, A., Moore, A.D., Collins, H.P., 2012. Impact of deficit irrigation on tuber yield and quality of potato cultivars. J. Crop Improv. 26, 1–17.
4. Epstein, E., 1966. Effect of soil temperature at different growth stages on growth and development of potato plants. Agron. J. 58, 169–171.
5. Singh, G., 1969. A review of the soil-moisture relationship in potatoes. Am. Potato J. 46, 398–403.
6. Švedas A., Antanaitis Š. Bulvių derliaus ir trąšų efektyvumo ryšys su meteorologiniais veiksniais // Sodininkystė ir dar-žininkystė. Mokslo darbai. 2000. T. 19(4). P. 117–132.
7. Bujauskas A. V. Bulvių selekcija. Vilnius, 2001. P. 36–41Ražukas A. Bulvės. Biologija, selekcija, sėklininkystė. Vilnius, 2003. P. 20–36.

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CALIBRATION PROCESS OF SOIL MOISTURE MEASUREMENTS

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Продуктивность роста растений зависит от местных свойств почвы и климатических условий, уровня углекислого газа в атмосфере. Интеграция в европейскую систему мониторинга окружающей среды путем применения стандартизированного индекса осадков для определения не только метеорологических засух, но и сельскохозяйственных засух очень важна для Литовского региона. Целью работы является сравнение значений продуктивной влажности почвы, полученных термостатическим методом с использованием измерений с автоматических агрометеорологических станций (типа Watermark).