DETERMINATION OF SOIL WATER CONTENT

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ABSTRACT

Groundwater is a physical characteristic that has a direct influence on plant growth and other aspects of human life. Determining soil water content is very important to determine how much or what percentage of water is in food or agricultural products, because one of the growth media for microorganisms in materials is water, so as to minimize the risks posed by microorganisms. Determination of soil water content is carried out in the laboratory. The water content in the soil depends on the amount of rainfall, the soil's ability to hold water, the amount of evapotranspiration, the organic matter content and the high groundwater level.

Determination of soil water content uses upper slope Bajra soil, middle slope Bajra soil, lower slope Bajra soil, Timor Leste soil and Ubud soil which are divided into Ubud soil one, two and three and it is found that each layer of soil has a different soil water content. -different. Lower Slope Bajra Soil has the highest water content compared to other soil samples, namely 14.819%, this is because the Lower Slope Bajra Soil contains more organic matter. Meanwhile, the soil that has the lowest percentage of water content is Tanah Timur Leste, namely 3.778%. All of these soil samples turned out to be hygroscopic soil because the percentage of hygroscopic soil was 1-15%. This means that all soil samples are soil with a coarse texture.

Keywords: *Determination, soil water level*

1. INTRODUCTION

Everyone has an interest in land. Land as a natural resource can be used by humans for various activities to meet their daily needs. Land as a resource used for agricultural purposes can be a resource that can be recovered (*reversible*) and can also be a resource that can be exhausted (Santoso, 1991). Soil in farming has the main function as a source of the use of nutrients needed for plant growth, and as a place for roots to grow and hold on as well as a place to store water which is very necessary for plant survival. Soil has an important role in the hydrological cycle, where the condition of the soil determines the amount of water that enters the soil and flows over the soil surface. So soil not only acts as a medium for plant growth but also as a medium for regulating water. Water also has an important function in soil, such as in the weathering process of minerals and soil organic matter, namely reactions that prepare soluble nutrients for plant growth. Apart from that, water also functions as a medium for moving nutrients to plant roots. The amount of water obtained by the soil largely depends on the soil's ability to absorb water quickly and transmit the water received downwards. The amount of water in the soil at any one time is referred to as soil water content (Gusli, 2018)

Groundwater is a physical characteristic that has a direct influence on plant growth and other aspects of human life. Water is found in the soil because it is held

or absorbed by the soil mass, retained by a waterproof layer or because the drainage conditions are not good. Water has an important function in soil, such as in the weathering process of minerals and soil organic matter, namely reactions that prepare soluble nutrients for plant growth. Apart from that, water also functions as a medium for moving nutrients to plant roots. The amount of water obtained by the soil largely depends on the soil's ability to absorb water quickly and transmit the water received downwards.

Determining soil water content is very important to determine how much or what percentage of water is in food or agricultural products, because one of the growth media for microorganisms in materials is water, so as to minimize the risks posed by microorganisms. So it is very necessary to know how much water content is in the soil.

2. RESEARCH METODOLOGY

2.1. Place and Time

This research was carried out from November 6 to November 27 2023, every Wednesday at 15.00 WITA.

2.2. Tool

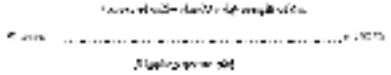
1. Filter
2. Weighing glass (tin)
3. Weigh bottle
4. Drying kiln
5. Exicator

2.3. Material

Various kinds of soil samples

2.4 Ways of working

1. Weigh the air-dried soil and have sifted it through a 0.2 mm sieve, twice 10 grams in a weighing glass or tin. 2 x 10 grams of soil is called duplo. Each calculation is always based on the average price of the two soil samples in the two weighing bottles.
2. Dry both soil samples in a drying oven with a temperature of 105^0C to constant weight. When placing it in the drying kiln, the bottle or tin cap must be opened.
3. After that, take the weighing bottle and the soil and cool it in a desiccator.
4. Once cool, immediately weigh:
    a. Bottle and soil
    b. Just the bottle (it's better to weigh the bottle before use).
5. The weight of the soil can be calculated (weight of the bottle + soil – weight of the bottle).
6. The weight of soil water can be calculated = 10 grams – absolute dry soil weight.
7. The soil water level can be calculated as follows:



8. Absolute dryThe average weight of water from the two examples above is the water content of the type of soil investigated.

3. RELATED RESEARCH

Soil consists of three phases, namely solid, liquid and gas. The liquid phase is groundwater that fills parts or all of the empty spaces between solid particles. Water in the ground can be classified into gravity water, capillary water and hygroscopic water. Gravity water is water that cannot be held by the ground, but seeps downwards due to the influence of gravity. Capillary water is water that is absorbed, usually in a layer around soil particles and in capillary spaces. Hygroscopic water is water that is absorbed from air water vapor by soil particles, attached to the surface of the soil particles in the form of a thin membrane consisting of layers of water molecules.

Soil water content is the concentration of water in the soil, usually expressed by dry weight (Sutanto, 2015). Water content at field capacity is the amount of water in the soil after excess gravity water comes out and is expressed significantly, usually expressed as a weight percentage (Sutanto, 2015). Soil water content can be used to calculate soil property parameters. Soil water content depends on the amount of rainfall, the ability of plants to retain water, the amount of evapotranspiration, and the organic matter content. This is related to the influence of texture on the proportion of colloidal material, pore space and adsorptive surface area, the finer the texture, the greater the quantity, so the greater the capacity to store water (Hanafiah, 2014). The amount of water content in the soil is closely related to the amount of water tension in the soil. The amount of water tension shows the amount of energy needed to hold the water in the soil. Water can absorb or be retained by the soil due to the forces of adhesion, cohesion and gravity, because water is hygroscopic and capillary water (Hardjowigeno, 2003).

4. RESULTS AND DISCUSSION

The results of observations of soil water content showed that each soil layer had different soil water content. Based on observations of soil water content carried out in the laboratory, the following data can be obtained:

Table 1. Soil Water Content Observation Results

No	Soil Type	Water Level (%)	Criteria
1	A (Upper Slope Bajra Land)	13,616	Low
2	B (Middle Slope Bajra Land)	13,812	Low
3	C (Lower Slope Bajra Land)	14,819	Low
4	D (Land of East Leste)	3,778	Very low
5	E (Ubud Land I)	8,752	Very low
6	F (Ubud Land II)	11,979	Low
7	G (Ubud Land III)	14,58	Low

Source: Primary Data,2023

Based on the table of observations of soil water content, it is found that each soil layer has a different soil water content. Hardjowigeno (1993) concluded that the water content in the soil depends on the amount of rainfall, the ability of the soil to hold water, the amount of evapotranspiration, the organic matter content and the high ground water level.

In table 1, it can be seen that soil C (Lower Slope Bajra Soil) has the highest water content compared to the other soil samples, namely 14.819%, this is

because soil C (Lower Slope Bajra Soil) contains more organic matter. This is in accordance with the opinion of Yuniwati (2017) who states that the higher the level of soil organic matter, the higher the level and availability of water in the soil. Meanwhile, the soil that has the lowest percentage of water content is soil D (Tanah Timur Leste), namely 3.778%. All of these soil samples turned out to be hygroscopic soil because the percentage of hygroscopic soil was 1-15%. This means that all soil samples are soil with a coarse texture. This is in accordance with the opinion of Madjid (2009) who states that soil with a coarse texture has less water holding capacity than soil with a fine texture and Rahmadi (2014) who states that soil with a coarse texture will retain less water content.

5. CONCLUSION

The soil water content contained in each soil layer is different, where the organic matter content is highest in the lower slope Bajre soil, namely 14,819% and the lowest in Timor Leste soil, amounting to 3,778%. All of these soil samples turned out to be hygroscopic soil because the percentage of hygroscopic soil was 1-15%.

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