Research Name : Study on the Cultivation of Vegetables with the Use of Covering Materials Affect ed Moisture. pH Soil Fertility

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Abstract

The purpose of this study was to study the effect of growing soil water and to compare the effectiveness of growing saffron with the use of dry leaves as biological mulch with bare soil in maintaining moisture, soil temperature, and minerals. The experiment divided the area into 4 types: (1) bare soil, (2) soil in which vegetables are grown, and (3) soil for planting vegetables + shredded dry wood, (4) soil for planting vegetables (full-leaf dry wood), and measurement of soil moisture, temperature, and minerals for a period of 4 weeks.

Studies have shown that plots where vegetables are grown have a better soil moisture value than bare soil. When planting vegetables together with mulch, the leaves do not tear, and the torn leaves are ground cover. It was found that soil moisture is no different from growing vegetables alone, but using untorn leaves as mulch can be preserved. The N, P, K values of the soil are better than in other conditions.

Bio mulch is an effective approach to soil and water conservation, can reduce soil erosion problems in sloped areas, increase water efficiency, and help create a suitable environment for the growth of economic crops. The results can be applied to the agronomy system for restoration of degraded areas and sustainable management of natural resources.

Keywords: ground cover, coc, soil moisture, biological mulch

Acknowledgments

The research "Cover Plants to Reduce Soil Erosion and Save Water Using Peperomia pellucida (L.) Kunth" was completed. The researcher would like to thank Teacher Jiraporn Sirirat for providing advice, knowledge, and suggestions that are useful for the research from the beginning to the completion. Thank. WichenMatu School for providing the facilities, materials, equipment, and information related to this research study, as well as thank all friends and people involved for their assistance. Support and encouragement throughout the research period. The value and benefits of this research The researcher would like to present it to all those involved if there are any shortcomings. The researcher would like to accept and apologize on this occasion.

Introduction

Thailand has a tropical climate, which results in most agricultural areas experiencing constant soil moisture loss. Especially in agricultural areas and sloped areas. Relatively high temperatures and uneven rainfall. As a result, the soil loses water through a rapid process of evaporation and permeability. Such problems lead to dehydration of plants. It affects the growth and productivity of agriculture. Therefore, farmers need to use more water to water their crops. This causes higher production costs and can lead to the loss of minerals and organic matter in the soil. This is an important factor for soil fertility. The use of ground cover plants and organic mulch is one approach that has been recognized as helping to improve the soil's water holding capacity. It reduces the evaporation of water from the soil surface and helps to retain soil moisture effectively. Ground cover plants also play a role in lowering the soil surface temperature. It increases water seepage into the soil and helps improve the soil structure to be suitable for water holding. The plant chosen for this project is Peperomia pellucida, a small, short-lived, fast-growing biennial plant to grow well both indoors and outdoors. The stems are succulent, the leaves are bright green and dense. It can quickly cover the soil surface. The root system, although not very deep, is widely spread, increasing the soil's water-holding capacity. Spinach is an easy-to-care plant. does not require a large amount of water and fertilizer; It is also a common medicinal plant and local vegetable. This study focuses on comparing the water retention capacity of soils. The use of dry leaves as a biological mulch to maintain soil moisture and reduce soil surface temperature to be used as a soil and water management approach to reduce water use in agriculture to reduce farmers' production costs and promote sustainable agriculture in the future.

Objectives of the research

1. To study the effect of growing vegetables on humidity. ,pH and Temperature Soil Minerals (N,P,K) Soil Water Retention

2. To compare the cultivation of vegetables with bio-mulch, which is the use of dry leaves and torn dry leaves.

Regarding moisture, pH and temperature, soil minerals (N,P,K), soil water retention

Research Questions

1. Growing vegetables affects soil moisture. Acidity–alkalinity (pH) Surface Temperature The amount of nutrient minerals in the soil (nitrogen, phosphorus and potassium) and the ability to retain water in the soil. Compared to bare soil? How?

2. Planting vegetables with bio-mulch, including dry leaves and torn dry leaves, affects soil moisture, acidity-alkalinity (pH), and soil surface temperature. Is there a difference between the amount of nutrient minerals in the soil (N, P, K) and the water retention capacity in the soil?

Research Hypothesis

1. The soil in which the soil is grown will have a higher soil moisture and a lower soil surface temperature. It has a higher content of nutrient minerals (N, P, K) in the soil for a better water retention capacity than bare soil.

2. The soil in which the soil is grown with biological mulch, especially torn dry leaves, will help retain moisture in the soil. Reduce soil surface temperature. Maintain pH within the optimal range increases the amount of nutrient minerals in the soil (N, P, K) and increases the water retention capacity of the soil better than using dry leaves without tearing.

Materials and equipment and methods of conducting research

Materials & Equipment

1. Universal Indicator Paper

2. Loam Soil

3. Seedlings for planting as ground cover plants

4. Biological mulch (Thick dry leaves/thick dry leaves with tear)

5. Shower watering

6. Beaker

7. Digital Scales

8. Soil moisture meter

9. ชุด NPK Test Kit

12. Infrared Thermometer

13. Measuring Cylinder

GLOBE Measurement Principle

1) Pedospher (Soil) Measurement Principle

2) Principles of biosphere measurement, principles of measurement methods for soil cover

Designation of study points

Using pots about 4 inches wide, 16 cm wide, 10 cm deep, 4 pots

Pot 1 (Control Unit): Bare soil.

Pot 2: Plant plants to cover the soil of vegetables.

Pot 3: Plant plant vegetable cover + bio-mulch (thick dry leaves torn).

Pot 4: Plant plants to cover the soil of vegetables + bio-mulch (thick dry leaves)

Inside each pot, 3 data collection points are designated – the middle of the pot – the end of the pot to measure soil moisture, soil surface temperature, and collect soil samples at a depth of 5–10 cm. Before and after the experiment, a composite sample of each soil is used to analyze the physical and chemical properties of the soil.

How the research is conducted

1. Research Preparation Process

1. Study related theories and research.

-Use of soil cover plants

- Principles of measuring soil moisture with a soil moisture meter

- Principle of temperature measurement at a depth of 5–10 cm. cm

-How to measure the rate of water seepage in the soil

2. Designate the experimental area.

-Use 4 experimental pots of the same size, the size of the pot is about 4 inches, the width is 16 cm, and the depth is 10 cm.

- Use the same type of soil compacted similarly.

2. Procedure

Four slope simulated clay pots were used as the main area to test the handling of each pot.

Pot 1 Bare Soil

Pot 2: Plant plants to cover the soil of vegetables.

Pot 3: Plant plant vegetable cover + bio-mulch (thick dry leaves torn).

Pot 4: Plant plants to cover the soil of vegetables + bio-mulch (thick dry leaves)

- Use a moisture meter on the surface of the soil.

-Measure the soil surface temperature at the point where the potted plant is. – Middle of pot – end of pot

- Random soil samples are collected before and after the experiment. (5–10 cm)

Preparation of experimental plants

- Grow the seedlings and plant them in pots with a regular planting distance.

- Raise until the plants are established and have similar soil cover (about 3–4 weeks).

-Growth period study

-Measurements and recording of results at different ages

-3-4 weeks old (adult)

-Soil Moisture (%)

-Ground Surface Temperature (°C)

-Soil quality

-pH (acidity–alkalinity of the soil)

-Macronutrient content N, P, K

-Comparative analysis of which age range of spinach has the best effect on reducing moisture retention and improving soil quality.

2. Procedure

2.1 Creating a simulated rain using a shower as a device to create a simulated rain to control the irrigation rate to be similar in all experimental pots. Before starting the actual experiment, a water flow test is carried out to obtain a uniform rainfall in each pot so that the results of the experiment can be accurately compared.

2.2 Collecting data each time you experiment after the simulated rainfall, soil changes in each pot were observed and data were collected with data related to the soil's ability to absorb and retain water in each experimental set.

3. Soil moisture measurement using a soil moisture meter. It is measured at a depth of about 5–10 centimeters by measuring 3 points in each pot as follows:

1. Potted plant area

2. The middle of the pot

3. At the end of the pot, record the soil moisture value during the following periods:

- Before the experiment

- 30 minutes after simulated rain

- After the experiment, 2 weeks have passed. The values were used as an indicator of the amount of water retention in the soil of each experimental set.

4. Soil Surface Temperature Measurement: Use an infrared thermometer to measure the soil surface temperature of each pot. Measurements were made before, during, and after the experiment to evaluate the effect of soil cover on reducing water loss from evaporation.

5. Measurement of Soil Water Permeability Rate The Infiltration Rate observes and records the amount of time it takes for water to seep into the soil after simulated rainfall.

6. Soil Quality Indicators: Soil samples from each pot are randomly collected at a depth of about 5-10 centimeters before and after the experiment. to be analyzed.

- Soil pH

- The amount of macronutrients in the soil is nitrogen, phosphorus (P), and potassium. (K) Such information is used to assess the relationship between soil quality and soil water retention capacity.

7. Recording and Tracking Experiment Results Repeat the experiment at least 3 times to increase the reliability of the results and study the effect of the growth age of the spinach on the amount of water storage in the soil. The data was collected at different ages, including:

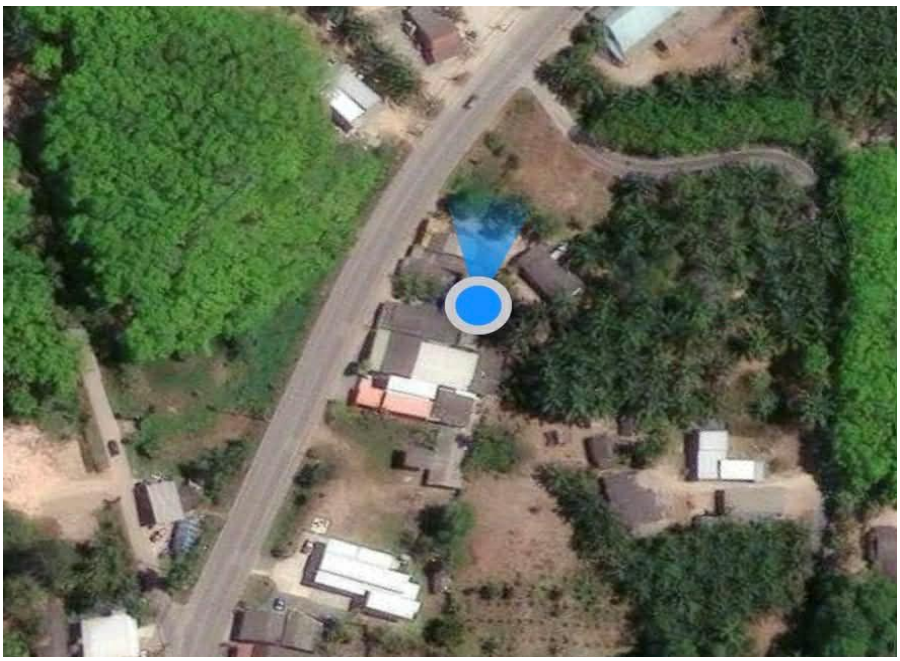
- 2-week stage: the plant begins to establish, the leaves and roots do not cover much soil.

- 4-week period : increased leaf cover; As a result, the soil can retain water better.

- 6-week period : dense leaves and root system, maximum soil cover. It clearly affects the amount of water stored in the soil, soil moisture, soil surface temperature, and soil quality. The data is then analyzed and compared to determine which age range of the spinach for most effective in increasing the amount of water storage in the soil.

Geographical coordinates

Study location	Latitude(N)	Longitude(E)
6 Moo 3 Khok Yang Subdistrict, Kantang District, Trang Province 92110	7.51258° N	99.51848° E



6 Moo 3 Khok Yang, Kantang, Trang 92110

findings

Experiment Table

Date	Pots	Moisture(%)	pH	T	Soil Minerals(mg/kg)		
					N	P	K
3/12/2568	Starting soil	32.33	5	29	42.33	44.33	117.67
10/12/2568	bare soil (watering is carried out for 1 day).	48.67	5	27	41.67	46	109.67
10/12/2568	Soil for planting vegetables (1 day of watering)	69	5.33	26.16	37	40.67	99.33
10/12/2568	Soil for planting vegetables + dry wood dumb (watering for 1 day)	69.3	5.93	26.67	28.67	25	78
10/12/2568	Soil for planting vegetables (full-leaf dry woody leaves)	67.3	5.33	26.5	29.33	34.67	82
07/01/69	Bare soil (watering is carried out for 4 weeks).	69.3	6	27	31.33	34.67	87
07/01/69	Soil for planting vegetables (4 weeks of watering)	69.67	6	26.67	28	30	78
07/01/69	Soil for planting vegetables + dry wood dumb (watering for 4 weeks)	68.67	6	26.67	29.67	31	82.67
07/01/69	Soil for planting vegetables + full dry wood dumb (4 weeks of watering)	68	6	26.3	24	26.33	63.67

From the table shows the properties of the soil where the vegetables are grown and the soil that is not grown. When growing vegetables for 1 month and controlling the environment to be the same, it was found that the pH temperature and The soil temperature value are no different from the bare soil. It does not grow vegetables. Growing vegetables can retain soil moisture better than bare soil. The moisture value increases from bare soil. When using mulch as a foliage, do not tear, and torn leaves as an additional ground cover. Soil moisture is no different from growing vegetables alone, but using non-torn leaves as mulch can be preserved. The N, P, K values of the soil are better than in other conditions.

The table shows the structure of the soil.

Pots	Measured Values		
	Fastening	Clay color	Ground beef
Bare soil.	Granular form	7.5 YR 4/2	Sandy loam soil.
Soil for planting vegetables	Granular form	7.5 YR 4/2	Sandy loam soil.
Soil for planting vegetables + shredded dry wood	Granular form	7.5 YR 4/2	Sandy loam soil.
Soil for planting vegetables + full dried wood	Granular form	7.5 YR 4/2	Sandy loam soil.

From the table shows the soil structure of bare soil. where the vegetables are grown and the soil covered with torn leaves and leaves. It was found that the soil structure did not change, namely the soil characteristics are granular and the soil color is 7.5YR4/2 and the soil texture is sandy loam.

Summary and discussion of research findings

According to a study of the joint cultivation of vegetables, the use of covering materials that affect moisture. Soil fertility pH found

1. Growing vegetables causes the soil moisture value to increase from bare soil. This means that the basilica can retain moisture in the soil well.

2. The use of mulch, namely leaves and torn leaves to cover the soil in the cultivation of vegetables, that the soil moisture is similar to that of growing vegetables alone. Moreover the use of torn leaves for mulching the soil will have more N P and K values than in growing vegetables in bare soil. This indicates that mulching using non-torn leaves reduces the amount of mineral losses in the soil.

3. According to experiments, planting vegetables with mulching with torn leaves will retain water and reduce mineral loss.

References

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