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The impact of the cyperus rotundus on the germination and growth of barley seeds

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The impact of the cyperus rotundus on the germination and growth of barley seeds

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Abstract:

Weeds are the most dangerous enemies of agricultural crops as they have a role in inhibiting the growth of crops through mechanical competition and hidden competition. Observing the growing prevalence of this grass in many farms during our visits to cover the implementation of the land cover protocol we adopted a scientific experimentation to study the impact of the cyperus extract on the germination of barley seeds by answer the following questions:

1- How fast is the germination of barley seeds after adding cyperus extract to the soil?

2-How does the cyperus extract affect number of germinated seeds?

3-How does the cyperus extract affect the growth rate of the barley plant?

4-Do the characteristics of the soil on which cyperus grow get affected?

We applied the study in school and farm where we took a samp of cyperus plant and worked to make cyperus extract with different concentration (0%, 10%, 20%, 30%). Then we watered the soil in 4 pots and took measurements of growth for a month through the application of the land cover protocol. The soil Protocol has also been applied to measure the conductivity ,Salinity and acidity of the soil on which Cyperus plant grows and other soil on which Cyperus does not grow. The study results indicated that the cyperus extract inhibited the seed germination and decrease the growth rate of barley. In addition , the values of the conductivity and salinity was low for soil where plant grow compared to a sample of soil that does not grow on it. From these results, we recommend that farmers need to get rid of the cyperus weeds continuously. They can also filter organic fertilizer before using it to get rid of any dangerous weeds and use the organic fertilizer in agricultural cycle.

Key words:

Weeds: Any plant that grows in an inappropriate place .It competes neighboring crops for water, space, light and nutrients.

The Hidden competition: herbs secrete inhibited chemicals in the soil affect the neighboring crops.

Introduction and literature Review:

Barley is herbal annual plant known as Graminaceae species. Many of them are grown as it is considered a strategic grain that is included in food safety items for humans and animals. It contains starch ,minerals, proteins and has many important medical benefits.

Cyperus rotundus is a plant that lives a long life with rhizomes root system with lots of tubers under the soil surface. It has red flowers or violet color do little to produce mature seeds. Its roots grow at depths of 1.5 meters in the soil.

Cyperus weeds are mainly reproduced through the tubers. It is classified as the world's most dangerous grassland that threatens agricultural production (Wikipedia). Cyperus affects crops through mechanical competition over the place ,the water light and food elements as well as hidden competition, the secretion of inhibited chemicals which reduces productivity. Cyperus weeds Invade cultivated crops ,roadsides ,banks of irrigation channels and waterways. Before decades It was used for producing food , medicines and perfumes.

The seeds of cyprerus is spread by wind and the tubercle can latency overcome violent conditions of heat and drought, valleys, and lack of ventilation of the soil as well as spread in the feet of farmers , animals , farming equipment, natural fertilizers. Therefore, the danger of this plant in that fast-spreading and fast in adapting to different environmental conditions.

The weed is found in approximately 92 countries around the world, including the Sultanate of Oman[(5)]. As observed in the farms it grows heavily on sides of crops and irrigation channels.

Cyperus weed is combated in several ways . farmers constantly uprooted it manually or mechanically., use the agricultural cycle, flip the ground, reducing the plant distance between crops to reduce the available area for the growth of cyperus and the use of pesticides. Several studies have indicated that the herbicide klifoset reduced total growth of root for the cyperus plant significantly plant.(Kazem,2012)(Iqbal,2012)

Research Methods:

A-Research Plan:

1-The research plan timetable.

The Month	The plan of action
November	The selection of the problem questions
December	The collection of adequate information
January	Data collection and analysis and discussion of the results
February	Reaching Final conclusions and writing Search

Table (1): The research plan timetable

2. The distribution of tasks of the work on the research team.

Students	Work
Ria Al Hashimi , Ayah Al Hashemi	Identify the research problem and identify the required tools and processing
Ria Alhashmi, Ayah Al Hashemi	The work of the farm visits and the collection and analysis of laboratory data
Ayah Al Hashemi	Enter data in the Site
Ria Al-Hashmi	The conclusions reached by the collected data
Ria Al Hashmi Ayah Al Hashemi	Writing the final Research

Table (2) distribution of roles on the research team

3-collect information from relevant sources such as:

school library, internet and the notes of the program (GLOBE).

Asking Department of agricultural development to give us some information about cyperus plant:

" cyperus plant is one of the harmful weeds which is disturbing the farmers. It is widely spread on farms. It compete with crops on water and nutritional elements and hinder the growth of plants. It is increased through seeds as well as the small tubers which are connected to each other with a string of roots in the soil. It is chemically resistant to be sprayed with a pesticide dedicated to such grasses or manually by uprooting or burning them"

4. The choice of study sites to apply study and data collection.

The site	Work
farm	1. Note the spread range of the cyperus plant 2. Take a sample of the plant 3. Take a sample of the soil that cyperus plant grows on it and another sample the Cyperus does not grow on it from two different locations in the same farm to be checked
The Laboratory of school.	1. Conduct the practical experiments for the preparation of cyperus plant extract. Make several concentrations of it and plant cultivation.

The Table (3) Search plan application sites.

5-Determine the appropriate protocols applied to collect the data.

Work	The appropriate protocol
Calculating the number of seeds germinated and measuring the length of the plant.	Earth Cover Protocol
Check the conductivity, PH and salinity of the soil	Soil Protocol

Table(4) protocols used in the research

6. Select the devices and appropriate tools to implement action steps:

4 pots have the same type of soil, the cups, flask, filter paper, a ruler, tester, distilled water, the measurement of PH, salinity gauge , determining the sites).

7-Start the study application

Question Search	The Protocol	The mechanism of application
1-How fast is the germination of barley seeds after adding cyperus extract to the soil? 2-How does the cyperus Extract affect the planted seeds? 3-How does the cyperus Extract affect the on the growth rate of the barley? plant?	protocol of Earth Cover	Cut the amount of cyperus, chop it, then grind it and next mix it with water using blender. Make different concentration and study the effect of it in barley plant, write observation and results about growth of barley.
Do the characteristics of soil get affected when cyperus plants grow on it?	Soil Protocol	1. Taking two soil samples, one where cyperus plant grow on, the other one plant does not grow, examine all of the CONDUCTIVITY ,SALINITY and ACIDITY for both samples.

8. The collection and organization of data in the tables represent the chart

9. Enter the data in the program site www.GLOBE.gov

10. reaching conclusions and recommendations.

B- A site survey:

This research has been implemented in Al-Kamil ,Al Sarqiah Area South cyperus plants have been collected from farms, and application protocols have been applied in the school laboratory .

Figure (1):The image of the geographic area of the site search application

C- The collection and analysis of data:

We collected data on the first, second and third question through Preparation of 4 pots containing the same type of soil, adding cyperus extract , and cultivating the same type and number of barley seeds .Then note the samples and follow-up the four pots daily to record of any of the four concentrations of the extract where the seeds were first grown , the number of seeds grown in each day and measure the length of the barley plant for a month noting the changes that have been made in the barley plant.

The answer to the fourth question was through the collection of two soil samples from the same farm, one cyperus plants grow on and other from another site in the same farm cyperus plants don't grow on and conduct laboratory examination to determine the characteristics of two soils (CONDUCTIVITY, SALINITY and ACIDITY)

Pictures of the application of activities:

Results:

30%	20%	10%	0%	Concentration of cyperus extract / Date
-	0.5	0.2	1.4	17\1
0.4	0.9	0.7	2.4	18\1
0.5	1	0.82	3.2	23\1
0.5	1.1	0.9	3.7	25\1
0.7	1.3	1.2	4	29\1
1	1.7	1.2	5.2	5\2
1	1.7	1.7	6	11\2
1	1.8	2	7.4	13\2
1	2	2	8.7	16\2
1	2	2.3	10.7	18\2
0.6	1.5	2.1	9.3	Growth rate

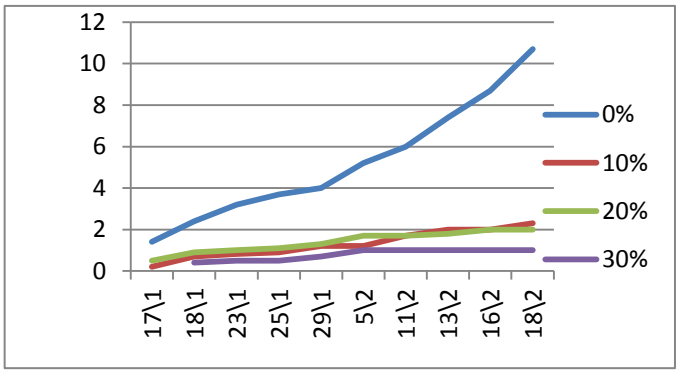
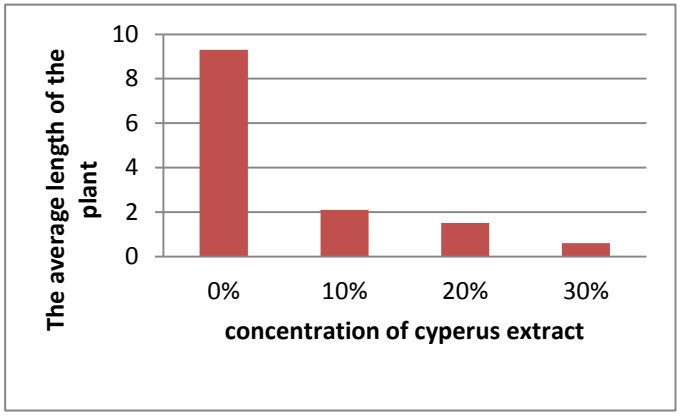
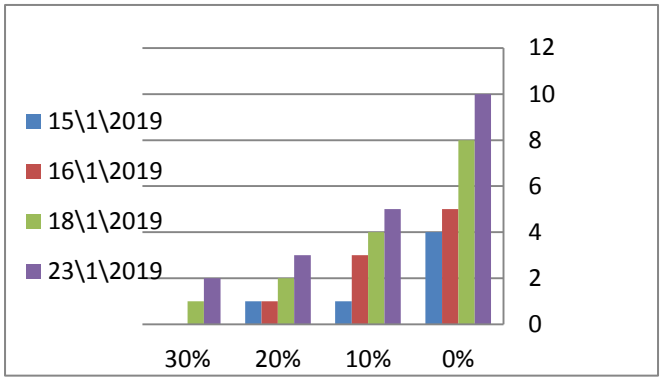


Chart (1): The length of the plant in four different concentrations



Chart(2): The growth rate of plant with different concentration.

No. of seeds germinated				Day & Date
30%	20%	10%	0%	
0	1	1	4	15\1\2019 Tuesday
0	0	2	1	16\1\2019 Wednesday
1	1	1	3	18\1\2019 Friday
1	1	1	2	23\1\2019 Wednesday
2	3	5	10	The Total



Chart(3) : The numbers of seeds germinated in different of concentration of cyperus

Soil far from cyperus plant	soil free from cyperus plant	Properties
1232	731	Conductivity
620	583	Salinity
8	7.84	PH

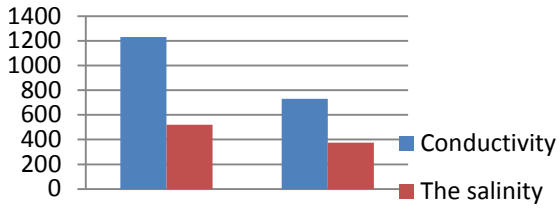
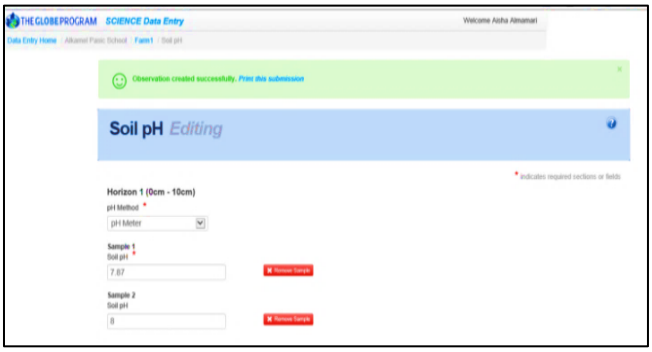
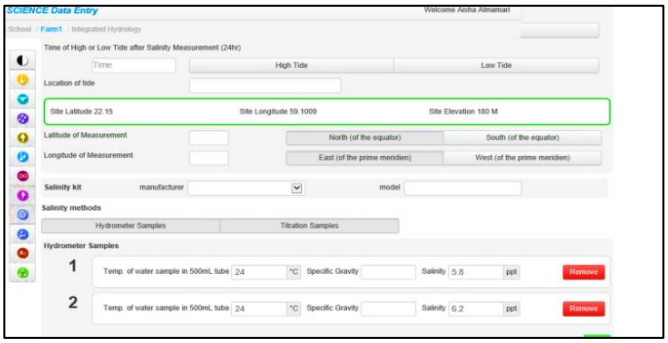


Chart (4): Comparison of salinity and connectivity in the soil where cyperus plant grows and other far from the place of growth.

-Enter data in the site:www.GLOBE. gov





The pictures shows the impact of cyperus extract on the growth of barley plants:

Discussion:

1- Our results indicated how dangerous and harmful the cyperus plant on different crops, especially barley. Chart(3) answer the first research question: the total number of barley seed germinated in the soil that do not contain cyperus extract germinated all (10) while this number decreased in the soil containing cyperus extract with 10% concentration that only 5 seeds grew out of 10 seeds planted. When the cypersu extract increased, the number of barley seeds growing became less. In the soil with 20% cyperus extract only 3 seeds germinated out of 10 while in 30% cyperus extract a fewer seed germinated (only 2) of barley seeds out of ten seeds planted .

As for the speed of seed germination, the greater the concentration of the Cyperus plant extract added to the soil, the speed of germination decreased. When concentration was 0% is applied ,the barley seeds began to germinate in the second day of planting but when the concentration was 30% ,the barley seeds started to germinate after 5 days of planting. Our observation and data show inverse relationship between the concentration of cyperus extract plant and speed of seed germination .

This data shows the inhibition of the components of the cyperus plant to germinate barley seeds and delay them. The rate of inhibition differed according to the concentration of the extract of the Cyperus plant , the greater the concentration, the greater the rate inhibition of growth. This indicates that cyperus plant produced toxic chemicals that affect the reduction of the growth of seeds and plants in large rates.

Dr. Sayed Ashour has shown in his book " Weeds and Herbicides" studies conducted in India which proved that the cyperus plant can produce 100 tubers in 3 months and that the organic material decomposed from the ground parts of the plant may be released toxic substances for agricultural crops so crops productivity will decrease . Barley plant growth had reduced by about 25% when they were grown in soils that left the soil parts of the cyperus to decompose for a few months.

2- Charts (1) and (2) indicated that the geminated barley seeds have recorded the highest growth in the soil that does not contain the cyperus extract 9.3 cm (9.3cm=10.7-1.4) While noticing the very low growth rate of the seeds of barley in soil containing less 10% cyperus extract and its growth rate was considered 2.1cm =(2.3-

0.2) .Moreover, the rate growth of barley in the soil which has a 20% of cypers extract was 1.5 cm (2-0.5=1.5 cm) while barley plant growth rate was 0.6 cm (0.4-1.=0.6cm) in the soil that contain 30% of the cyperus extract.

3- The chart (4) related to the characteristics of the soil showed that the value of the conductivity and salinity was less in the soil which the cyperus plant grows on compared to the distant soil that does not grow cyperus plant. From these data we conclude that the cyperus plant has a great ability to absorb nutrients from the soil and compete with neighboring crops .

4- Figures (1-4) show status of the growth of the barley seeds. The Soil that does not contain cyperus extract, seed germinated naturally. The length of the plant during the month of measurements and the status of the plant was good compared to the growing seeds in concentration of 10% as its leaves were weak and yellow. The growing seeds in concentration of 20% and 30% were yellow , short and are very few. These results indicate how dangerous the spread of weeds on plants and crops.

Conclusion:

Through our visits to some farms to apply the protocol of the land cover and our observation of the intensive spread of this cyperus rotundus on the sides of crops. We have worked on the research for the type of weeds and their importance and damage. We have found that it is one of the most dangerous weeds that affect the various crops in the world and not only in Oman. Therefore we used the method of scientific experimentation to prove the how danger is the cyperus plant and its effect in the growth and productivity of crops. We applied the soil and the land cover protocol. Through the obtained data, it was concluded that the cyperus plant has a significant and dangerous effect on crop growth. Barley seeds germination as well as the length of the plant were decreased to large rates when the concentration of the cyperus extract increased .The Cyperus plant is very harmful as it absorbs the nutrients from the soil competing with neighboring crops. The values of conductivity and salinity was less in the soil on which the cyperus plant grows compared to other soil where does not grow in the same farm.

These conclusions have encouraged us to research more and more about the most famous and dangerous weeds highly spread

in the country to inform farmers continuously to use chemical or mechanical methods in order to get rid of the weeds.
We are looking forward to expanding the evidence of the damage of this weed through an experiment to observe the impact on crops productivity and designing a machine that helps farmers uproot weeds from roots and get rid of tubers at the same time.

Thanks and appreciation:
We would like to extend our great thanks and sincere appreciation to our teacher Aisha Al Ma'amari for her efforts and guidance during the work of this study and the department of our school for their cooperation to use laboratory tools. We also thank Mr. Saeed Hashemi from the Department of Agricultural Development for the information he provided us. We also thank the GLOBE programme supervisors in Al Sharqia region for their continuous support and Ms. Sheikha Al Hashimi, a chemistry teacher, for preparing different concentrations of cyperus extract.

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