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Use of Modern Technology to Combat Desertification In Iraq

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Abstract: *This study is to find out how difficult it is to combat modern desertification of Iraqi soil. In an experiment conducted in the field of the Faculty of Agricultural Engineering Sciences, using sand soil brought from Najaf province, Simple tools were used to replace the coccon container, used in different parts of the world but not in Iraq. The form of cake industry has been modified for use in the experiment after it has been wrapped in nylon so that the aluminium does not react with the water, it is equipped with a thick thread with high absorption capacity. Three parameters were used: peat moss, animal manure 50% fertilizer 50% soil, and bio-fertilizer. Here, the mycorrhiza used with 100 g / kg soil, used olive trees are able to drought. By coccon container, the results were encouraging and positive and achieved by modified medium to produce the same result for the cocoon, but at a lower cost by proved the aim of the experiment to continue to grow with the least amount of water, and Comparison of the characteristics of vegetative growth, that the increasing in the number of branches in all treatments is a marked increase, especially in the treatment of the bio-fertilizer used in the Mycorrhiza and Control*

Key words: *coccon container, Desertification olive trees, organic fertilizers*

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I. Introduction

Desertification is a serious problem threatening the environment and damaging all aspects of life. That enforced the international community to combat it through various international, regional and national organizations, since it constitutes an environmental, economic, social and health challenge. As stated by [1].

In 1994, UN defined the concept of desertification as the deterioration of the fertility of the soil in areas which are arid or semi-arid and dry or semi-dry due to climatic changes and human activities. This means that desertification is a process which destroys the vital bio – energy of the land, causing the deterioration of the environmental system by causing it loses its balance [2].

The factors most likely to be included in the deterioration of the land may include the erosion of the soil, the disappearance of the plant cover and salinization. [3], [4], [5].

A longer term exacerbation of soil moisture stress (19 to 90 %) has been noted in the areas that were susceptible to wind-induced desertification, due to a high evaporation rate caused by extreme wind events for a substantial period [6].

In addition, the human activities significant contributory factors in the process of desertification which summarized by:

1. overgrazing which removes vegetation cover;
2. over cultivation which exhausts the soil;
3. deforestation which destroys the trees that protect the soil; and
4. poorly drained irrigation systems which turn croplands salty.

It is not clear whether agricultural activities are good alternative to combat desertification in many countries. Such activities may have negative impact due to ecological and economic considerations. As stated by [7], agriculture-related activities are the major causes of desertification. According to FAO's estimates [8], agricultural activities are responsible for up to 30–35% of land degradation in the Middle East. The soil loss due to agricultural activities is especially evident in countries with low amount of arable land, such as Iraq, Morocco, Syria and Tunisia. But this is only expected to get worse. Across the world climate change is set to exacerbate problems where poor land use and population pressure is already putting an immense strain on finely balanced ecologies.

According to the European Environment Agency (EEA) 2008 data, in the areas of Southern, Central and Eastern Europe for which data was available, 8 % of the territory, corresponding to about 14 million hectares, showed "very high" and "high sensitivity" to desertification.

The affected part increases to more than 40 million hectares if moderate sensitivities are also taken into account. The situation is most serious in Southern Portugal, a large part of Spain, Sicily, south-eastern Greece, Cyprus, and the areas bordering the Black Sea in Bulgaria and Romania. A recent study Desertification in the [9].

Adaptation of plants to ecological parameters of desert areas seems to be essentially required in the use of vegetation to combat desertification. Although no special ecological adaptations other than life-cycle timing are commonly attributed to desert annuals, clear patterns of morphological, phonological, and physiological adaptations are used by many species [10].

However, a strategy for the desert areas development has been suggested to be based on urban development, possibly accompanied by compact pockets of intensive greenhouse agriculture. Such a development may justify economically the often large investment required for the provision of drinking water and be least damaging for the desert ecosystems, and compared to the agricultural path, may thus have less severe desertification consequences [11].

There are fine lines between drylands, decertified lands and deserts, but, once they are crossed, it is hard to return, as restoring soil is a slow process. It can take 500 years for 2.5 cm of soil to form but only a few years to destroy it. It is much more cost-effective to protect drylands from degradation than to reverse the process [9].

Iraq today faces serious hazard coming from desertification. The authors mentioned that 75% of the total land space of Iraq is under the effect of desertification, in recent decades, Iraq has droughts in most of its regions. Rainfall has fallen by 30% from the average. Water levels in major rivers have fallen by more than 50%, resulting in 70% rain-fed crop production and losses in wheat and barley production by 37% and 63% in the Central and Southern regions, respectively. It is estimated that Iraq loses around 250 square kilometres of arable land annually due to desertification. Water stressed agricultural lands has led to losses in crops 1% of GDP [12].

Worldwide, agriculture is the sector with the highest demand for water, largely overtaking the demand from other human and economic activities in water scarce regions. Thus, irrigated agriculture is often considered the main cause for water scarcity, and irrigation is accused of misuse of water, producing excessive water wastes, or degrading the water and land quality.

Desertification has been called the greatest environmental challenge of our times. However, irrigated agriculture is. [13].

The convention proposes the promotion of drought-resistant and salt-resistant crops and the development of rural markets. Attention should be paid to local plants whether they have already been domesticated or not. It is important to grow a wide variety of plants that are suited to local conditions.

Bio-diversity of crops helps to ensure both healthy soil and food-security. Organic growing should also be encouraged as this system reduces the damage to the land and alleviates some of the negative impacts of mono cropping.

A strategy for use of vegetation to control soil erosion has been developed that is specially targeted at hotspots and flow pathways in the landscape. It is based on the premise that most of the soil erosion in semi-arid areas is by water erosion along specific flow lines. Vegetation can reduce that connectivity by decreasing erosion and increasing sedimentation.

The research combined mapping and analysis of the connectivity pathways and erosion hotspots with analysis of the most effective indigenous plants to control erosion and suited to the particular landscape position and environment [14].

The research works provided recommendations on locations for planting or encouraging vegetation growth and on suitable species. The eco-physiological properties of C. spinosa L., as a plant suitable for combating desertification, C. spinosa is a deep rooted, drought tolerant and a fire resistant species, and produces a great vegetative cover which protects soils from water loss, it could prove a real protectant in the erosion control, and suggested to be highly useful for the prevention of land degradation this result has been studied by [15].

A. mycorrhiza (AM) fungi can influence the development and stability of the plant-soil system as colonists of both root and soil. AM forms a link in an autocatalytic cycle of plant-soil interrelationships, thereby, the fungi improve plant growth through enhanced nutrient uptake, the more vigorous plant intercepts more windborne soil, this soil is bound by the mycorrhiza into a growing mound, and the mound provides more nutrients to the plants [16].

Aridity is a nature-produced permanent imbalance in the water availability consisting in low average annual precipitation, with high spatial and temporal variability, resulting in overblow moisture and low carrying capacity of the ecosystems, FAO Iraq 2018.

It is possible to slow the progress of desertification or even stop it completely, but it will require a worldwide campaign to improve agricultural methods, regenerate plant life and conserve precious soil fertility [17].

The first step is to replace destructive agricultural techniques at the grassroots level. Poor farming communities in developing countries need to be taught the long-term benefits of crop rotation, the use of

legumes and other cover crops to "fix" nitrogen back into the soil, sustainable irrigation methods, and techniques like terracing, which prevent water run-off and erosion in hilly, sloping land scapes [18].

The effect of increased soil nitrogen on the dominance of alien annual plants in desert area has been studied [19], the results indicated that increased levels of soil nitrogen from atmospheric nitrogen deposition or from other sources could increase the dominance of alien annual plants and possibly promote the invasion of new species in desert regions.

The olive tree is one of the tree plants belonging to the olive branch. It is one of the evergreen trees. It is considered an ecological and economic resource. It is a blessed tree mentioned in the Holy Qur'an. It is blessed with fruits and is famous for its cultivation in the Mediterranean region. Four thousand years BC, the olive tree is one of the most widely used trees around the world, where it is used in food, medicine, energy, and in decorations and furniture.

Olive is the only crop able to grow in local conditions. However, olive production may be among the more vulnerable systems to climate change since perennial crops adapt slowly.

There was a relationship between olive tree tenderness and dry olive.

Thus, under the same drought conditions, inactive orchards were less drought-resistant than young ones Locally, data showed that compact soils and soils containing more than 1% gypsum were not suitable for olive. Cultivation of olive trees in fertile wetlands is also a direct route. Trees for vegetative growth at the expense of fruiting.

Most olive trees are able to withstand drought, soil salinity and irrigation water, large and regular irrigation, proper fertilization and good service can reduce salinity damage [20], mentioned that the growth of the olive tree surpassed the new reclamation areas under conditions of drought, salinity and soil variability.

The objective of the present work was to:

1. Using a modern technology in a simplified way to determine its suitability for Iraqi soil. With different application.
2. Quantity of water used per plant during the experiment period.
3. Is it necessary to add fertilizers.
4. Comparison between plant growth in terms of vegetative period.

II. Materials and Methods

Experimenting in the field of the faculty Agriculture using Coccon method, which is one of the modern methods to combat desertification by reducing water use for irrigation in sandy soil. Surrounding by mix of sandy soil and different kind of fertilizers as follows

1. vegetable fertilizer (50% sandy soil + 50% peat moss)
2. manure fertilizer (50% sandy soil + 50% manure fertilizer)
3. Bio-fertilizer 100 grams / kg of sandy soil.

Soil texture was determined by measuring its components in the central laboratory of the faculty of Agriculture :70% sand,15 % silt ,5% clay

In the absence of a coccon container, use a similar one, a cake-making form, and a galvanized nylon coat to ensure that the metal is not reacted. An airtight cover is placed to prevent water evaporation, preventing it from leaking in an undesirable manner, and placing a thick thread in the middle of the container to supply the roots by water which grow in a hole 40 cm deep, where the container is placed and surrounded and covered by a soil mix with the above mixing rates to grow olive seedlings.

The soil was preparing before planting by mixing the percentage above and adding amount of water enough to make the soil mix around the roots saturated and leave it for an hour before planting the small olive trees 35 cm, then full the container with 2liters of water and close carefully to ensure that the water does not evaporate.

Many technologies can be used in dryland areas affected by desertification and drought. There is no single formula for technology transfer (or integration) that is successful for all situations.

III. Results and discussions

3.1. plant height After the standardization of plant height at the beginning of the experiment, the studied, the results showed a significant difference in plant height at the end of the experiment (fig No2), according to the fertilizer which has been added, the highest plant in the Control experiment was 80.33, this may be due to the fact that warm water - the presence of water in the container - increases and accelerates the decomposition of nutrients and extracts the largest amount of nutrients, especially nitrogen and potassium and the lowest height was in the plants that were added peat moss fig No:1 show the soil nitrate decomposition which effect the result of plant height.

in spite of organic fertilizer contains sugars and amino acids necessary for plant fruits [21], this case may explain that organic matter has not been decomposed yet or may be present in the soil sufficient for vegetative growth in the early stages of growth or adaptation of cultivars with soil conditions and climatic factors prevailing in the agricultural area, this is consistent with [22].

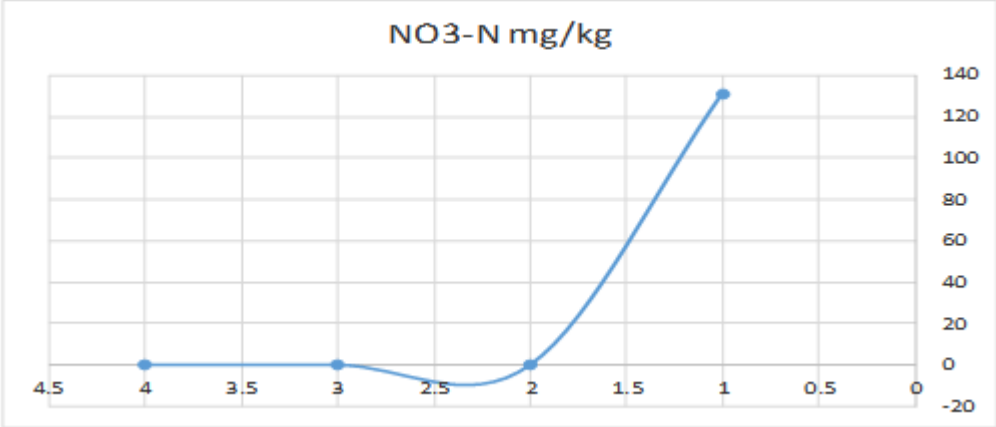

Figure 2 soil contain of NO3-N mg/kg

The increase in plants from manure fertilizer is due to the increase in the number of organisms capable of producing enzymes that analyse the organic matter and thus provide the nutrients and increase their readiness resulting in an increase in plant metabolism and thus increase the growth rate of the plant [23]. This is consistent with [22], be confirmed the increase in the length of the onion plant when using sheep manure

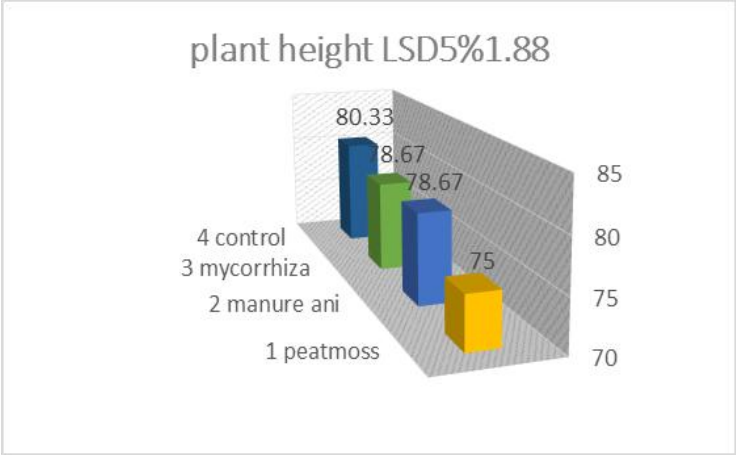

Figure 2 the different height of plant during growth

3.2. **number of leaves** The results showed a significant increase in the number of leaves for all the studied treatments. The highest percentage was recorded in treatment No. 2 (manure fertilizer) by 5.67%. The reason is that the fertilizer started to decompose and thus has an effect on the soil properties and the readiness of the nutrients, so it is considered a good enhancer for various soils [21].

In addition, they confirmed that the use of sheep waste increased the concentration of chlorophyll in the plant of Tomato, also found that the plants of treatment No. 3, by adding the Mycorrhiza got an increase of 2.67 due to the role of phosphorus and began to analyze .

Table 2 plant contain of Phosphor (total and available)

The control treatment increased by 2% and this was recorded an increase from treatment number 1, which is peat moss added was 1.67, this result may be caused by non-decomposition of organic matter from peat moss, [24].this is in the early stages of growth but in the mid stage, the treatment number 3 treated with mycorrhiza -fertilizer was the highest of 10.67, this is due to the decomposition of organic matter and phosphorus. The table 2, shows the highest value of soluble phosphorus in treated soil mycorrhiza Although this treatment has low number of total phosphorus, the release of nutrients continuously and easy to be absorbed by the plant, which makes it sufficient to meet its needs at that stage [25], this result effect the plant growth in this difficult situation and agree with [16].

During the third period of growth, the control treatment recorded the highest percentage of 27, and the bio treatment 14, the result about half, and then the manure fertilizer, 8.67, and the lowest percentage was for peat moss, 6.50The manure fertilizer recorded 5.33% and here the control recorded a minimum reading of 2% in the intermediate stage of growth.[26].fig31,2,3

The reason for the decline in the number of leaves in treatments 2 and 3 may be due to the consumption of nutrients and need to fertilize, but their continued growth indicates their adaptation to the environmental conditions prevailing in the agricultural area [27].

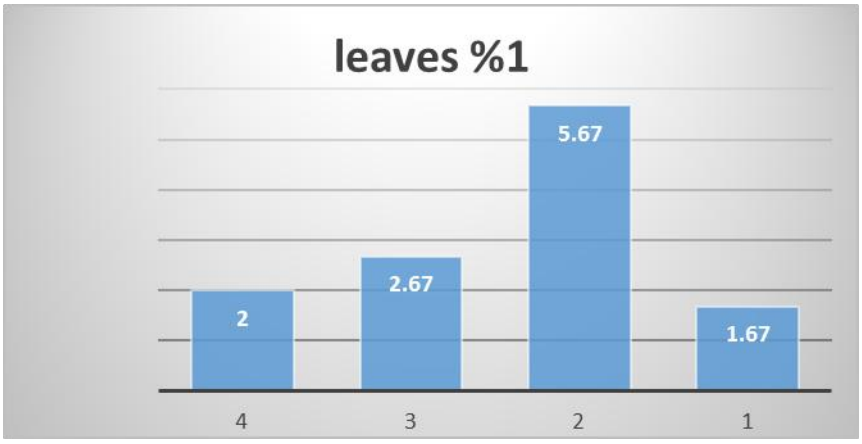

Figure 3.1 Increasing of leaves plant % in the beginning of growth

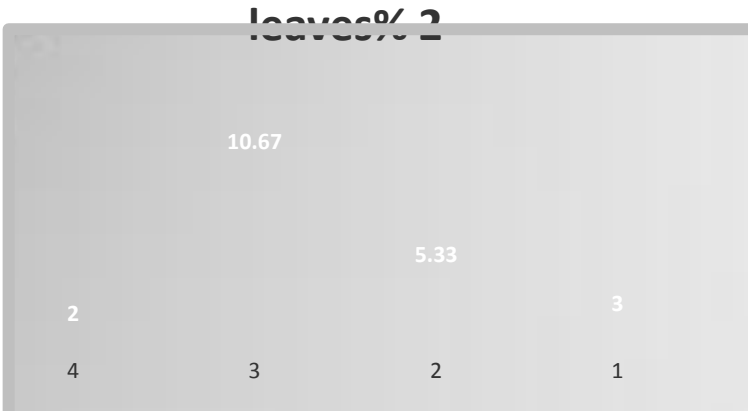

Figure3.2 Increasing of leaves in the middle of growth period

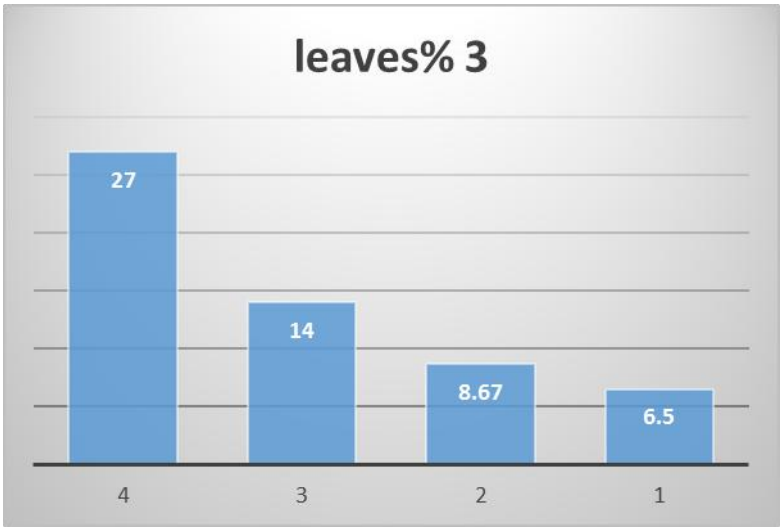

Figure3.3: The last period of the experiment

3.3. Number of branches

The results showed no significant differences in the number of branches for all studied treatments, although there was an increase in the number of branches of the treatments 2, 3,4, it is a positive result for controlling the longitudinal structure of the plant by determining absorb water from the root area The increase in the first stage of the growth was represented by control, this is considered a negative in this treatment to increase vegetative growth consumes the elements and reduces the quality of the plants, the absence of organic matter reduces the regularity of the decomposition of nutrients and absorption by the plant makes control of the absorption possible [28]. Unlike the peat moss treatment, which did not register any increase at the beginning of the growth phase.

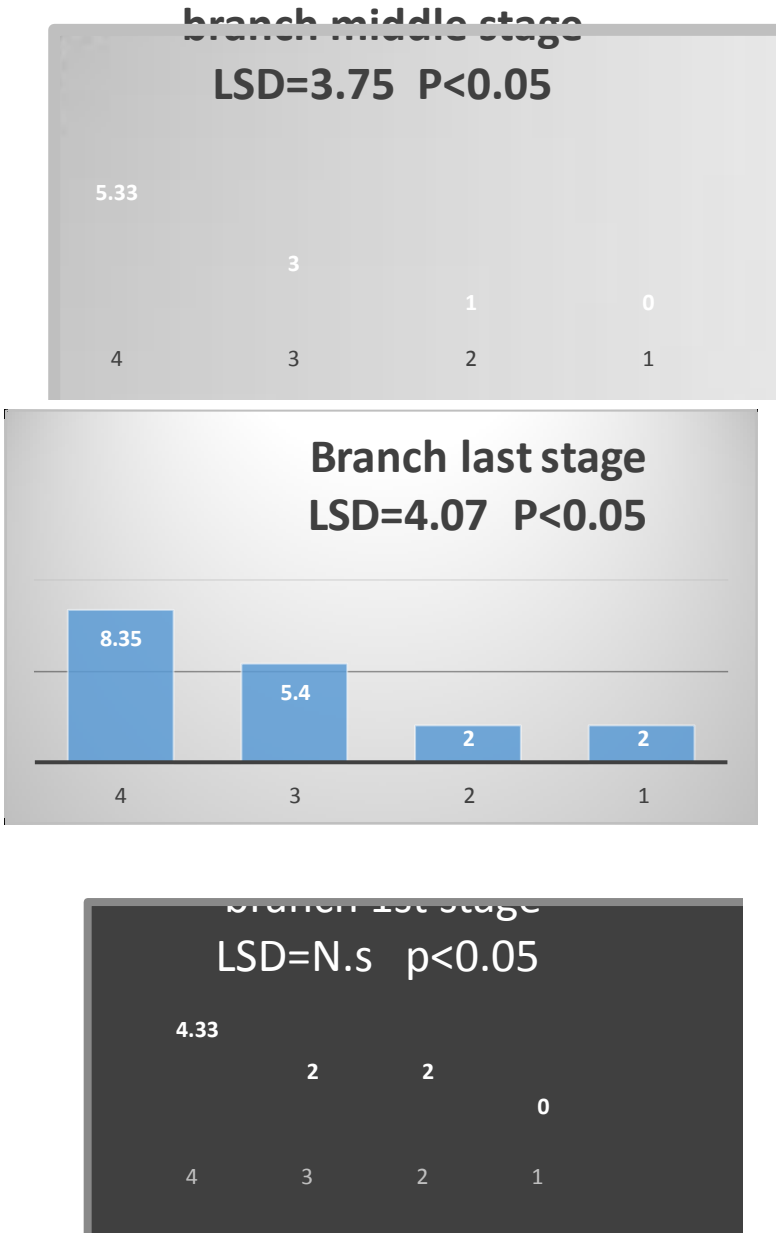

Figure 3: Branches during growth period

Table1: Soil characters

Sample name	pH	so %	Humusz %	K_A	ΣN %	ΣP %	ΣK %	NO_3-N mg/kg	P_2O_5 Mg/kg	K_2O mg/kg	Ca %	Mg mg/kg	Fe mg/kg	Mn mg/kg	Zn mg/kg	Cu mg/kg	$CaCO_3$ %
1.peat moss	7,30	0,150	1,59	<30	0,122	0,027	0,091	131	64,4	114	2,76	31,6	14,8	19,3	2,10	0,87	8,32
2manure	7,45	0,220	0,814	<30	0,038	0,023	0,146	99,2	104	167	2,65	54,8	11,9	25,8	2,24	0,67	6,72
3. mycorrhiza	7,65	0,046	0,520	<30	0,028	0,028	0,096	4,12	29,6	37,8	2,29	21,9	13,6	26,8	1,07	0,46	6,51
4.control	7,68	0,062	0,317	<30	0,028	0,027	0,105	24,8	28,2	34,6	2,70	22,6	9,09	25,2	1,02	0,54	6,93

Table 2: soil contain of total phosphors and available phosphors

Sample name		ΣP %	P_2O_5 mg/kg
1	Peatmoss	27	64,4
2	manure fer.	23	104
3	Micorryhiza	28	29,6
4	Control	27	28,2

IV. Conclusion

From the above, we conclude that the increasing in the number of branches in all treatments is a marked increase, especially in the treatment of the bio-fertilizer used in the Mycorrhiza and Control, as for the treatments of Peat moss and animal manure were less responsive, this means that the organic matter in the first and second treatments is less decomposed, but it is necessary to add to increase vegetative growth.

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