Effect of Emulsified Oil Derivative and Dripper Discharge under different moisture levels in Some Soil Physical Properties and Growth and yield of Sun Flower Crop (Helianthus annuus L.)

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A field experiment was conducted during the autumn season of 2016 in AL- Gumeej , at Qurna district - north of Basrah province, which located at 30^0 -56'- 24.8" longitude and 47^0- 27'- 52.0" latitude , to investigate the effect of some Emulsified Oil Derivative and Dripper Discharge under Water Deficit treatments on some soil properties and the growth and production of the sun flower (Helianthus annuus L.). The soil was Clayey and classified as Fine Silty , Mixed , active Calcareous , hyperthermic, Typic Torrifluvents (AL–Attab ,2008) . The experiment included three factors : First , type and concentration of the emulsified oil derivative with six treatment , Control (c) (without adding), Fuel oil 0.3% (o3) , gas oil 0.3% (g3), 0.5% (g5) and mixed treatment (1:1) betwean gas oil and fuel oil with 0.3%(go3) and 0.5%(go5) , Second , dripper discharge with two treatments 5 (Ld) and 15 (Hd) liters per hour respectively , Third was moisture level with two levels 0.85 (w1) and 0.65 (w2) of available water. The oil emulsified carryout by mixture of oil with enough quantity of water emulsification by addition artificial anionic emulsified agent (surfactant) with 2.5 to 3.5 ml m^{-2} at type of oil derivative by using mechanical mixer that was design especially for this experiment .All treated soil treatments were allowed to dissected then the experimented units are sown with sun flower seeds by parallel rows with a distance 25 cm between plants .

The studied factors were combined in factorial experiment by using randomized complete blocks design with three replicates . Soil samples were collected at 0-20 and 20-40 cm depths after a month of sowing and at the end of the growing season for measuring some soil physical and chemical properties including moisture and salt distribution (Pw and EC),Mean

Weighted Diameter (MWD) ,Soil bulk density (ρb) ,Total porosity (*f*) , And soil pentration resistance (PR). The moisture characteristic curve of some soil treatments was measured after one month of sowing. The saturated hydraulic conductivity (Ks), infiltration and infiltration rate were measured at the end of the season . Moreover , some plants parameters measured including Plants height , Leaf area index , shoot dry weight, grain weight and water use efficiency based on dry weight (WUEd) and grain(WUEg). The most important results obtained can be summarized as follows:

1. The results showed a significant increase in moisture content and decrease in soil electrical conductivity of all soil treated with emulsified oil derivative at the beginning and at the end of the growth season compared with control treatment (c). g5 and go5 were significantly higher in Pw and lowest in EC. Pw values also increased and EC values decreased with increased discharge from 5 to 15 L hr^{-1} and moisture levels from 0.65 to 0.85 of available water for both measurement periods .
2. The addition of emulsified oil derivative lead to improve soil physical and hydrological properties including increase in value of MWD , *f* , ks and accumulative infiltration and infiltration rate , in addition to reducing the values of ρb and PR as compared to control treatment, at the beginning and at the end of the growth stage , the treatment g5 and go5 showed the best results as compared with other conditioner. The increase of discharge from 5 to 15 $Lhr^{-1}$and moisture level from 0.65 to 0.85 of available water caused a significant increase in the values of MWD, *f*, ks , accumulative infiltration and infiltration rate and reduction in ρb and PR values at the beginning and end of the growth season.
3. Pw values decreased and EC increased with increase the horizontal distance up to 30 cm. The increase in discharge to 15 L hr^{-1} lead to an increase in moisture content and reducing the electrical conductivity up to 30 cm

distance from dripper in comparison to the corresponding distance at discharge 5 Lhr^{-1}.

4. The values of Pw, EC, ρb and PR increased, while *f* and ks decreased when soil depth was increased from 0-20 cm to 20-40 cm, for both measurement periods, and this impact increase with icreasing discharge from 5 to 15 Lhr^{-1} and moisture level from 0.65 to 0.85 of available water contributed to reducing the variations between these depths upon these characteristics.

5. The results of moisture characteristic curve showed that the increase in moisture content at low tension between (10 and 33 kpa) for all emulsified oil derivative, especially in g5 and go5 as compared with the control treatment, while they behaved differently with the high values of tension, where the moisture content at oil derivative decrease but caused increasing in Pw at the control treatment in the suction from 100-1500 kpa .

6. The values of saturated hydraulic conductivity , accumulative infiltration and infiltration rate increased at emulsified oil derivative treatment especially g5 and go5 . and when increasing emitter discharge to 15 Lhr^{-1} and moisture level to 0.85 of available water .

7. The values of the soil sorptivity factor S decreased and the values of the transition factor A witch calculated from the Philip equation (1957) increased for all emulsified oil derivative, the S values increased also and the values of factor A decreased for control treatment. The results also showed that the values of S factor increased and the values of A decreased, when the discharge is increased from 5 to 15 Lhr^{-1} and the water deficit from 0.65 to 0.85 of available water.

8. All emulsified divertive conditioner significantly increased the growth and yield of sunflower, represented by the plant height, leaf area index , the dry weight and grain weight compared with control treatment. The treatments g5 and go5 showed the highest values in all the mentioned indicators. The values

for all of these indicators increased when the emitter discharge increased from 5 to 15 L hr $^{-1}$ and moisture levels from 0.65 to 0.85 of available water.

9. Soil capability for saving water and available water increased as a result of the addition of emulsified oil derivative, which contributed to increasing the interval time between irrigation, less value appeared at g5 and go5 under 65% water deficit treatment by using 15 Lhr^{-1} emitter discharge .

10. Emulsified oil treatments appeared the highest WUE especially with g5 and go5 treatments and these impact enhancing at increasing dripper discharge from 5 to 15 Lhr^{-1}, while 0.65 moisture level treatment appeared higher WUE for dry weight but lower for grain yield compared with 0.85 moisture level treatment .