Evaluation of water harvesting in some wadis at west of mersa matruh north-western coastal zone, egypt

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The present study was undertaken to evaluate the water harvesting systems at El-Qasr area in Wadi Washka West of Marsa Matrouh North- western coastal zone, Egypt. An assessment study was carried out on two water harvesting (water-catchment) set-ups made by farmers in the region one using earth embankment and the other using stone embankment. Besides, a field experiment was carried out.The field experiment tested three ratio micro catchment size RI, R2 and R3. They were 1: 2, 1: 4 and 1: 6 (area of cropped : area of non-cropped) respectively, and use three soil surface treatment. They were a control ”non-treated soil surface”; ”compacted with a load of 6.1 kg.cm-2” and bituminous emulsion-treated surface ”0.2 L.m-2. The experiment was conducted for two wheat seasons ”2002-2003 and 2003-2004”. 1- Assessment of farmers systems of earth embankment versus stone embankment:Highest of over all system efficiency occurred with stone embankment followed by earth-embankment. Volumes of water stored in root zone for non- embankment, earth embankment and stone embankment for all rain storms were 40.66, 57.44 and 61.52m3 respectively in season 1; and 48.02, 67.85 and 72.8 m3 respectively in season 2.System efficiency for stone embankment was by 52%, while for earth embankment it was higher by 7% only, relative to non-embankment.2- Assessment of results of the field experiment regarding water-harvesting effeciency. a-Efficiency of run off :Means values of runoff efficiency for R1, R2 and R3 ratios for all storms were 76.6, 80.3 and 77.6% respectively in season 1, and 76.2, 83.1 and 79.5% in season 2. b-Efficiency of runoff storage:Mean values of storage efficiency for RI, R2 and R3 were 84.0, 85.0 and 84.5% respectively in season 1, and 80.8, 84.2 and 81.5% respectively in season 2.c-Overall efficienc of the water han estina s stem:Values of overall efficiency of system for the RI, R2 and R3 well 66.1, 70.9 and 66.3% respectively in season 1, and 62.8, 70.9 and 65.8% respectively in season 2. d-Efficiencies as affected by soil-surface treatment:In all cases, the positive response to the R2 ratio was particularly considerable where the soil-surface was treated with Bitumen, followed by the compaction treatment. 3- Assessment of results of the field experiment regarding crop performance : a- Height of wheat plant :Mean values of plant height R1, R2 and R3 were 33.0, 38.2 and 35.1 cm respectively in season 1, with R2 giving an increase of 15.7 and 8.8% over RI and R2 respectively in season 1. in season 2 values were 37.1, 44.2 and 40.6 cm for R1, R2 and R3 respectively;with increasing plant height by 19.1 and 8.8% over RI and R2 respectively.The bitumen treatment was more effective than compaction. Main values for increases caused by bitumen over compaction and non-compaction was 10.3% and 30.3% respectively in season 1; and 7.6% and 27.5% respectively in season 2. b-Yield of grains:R2 gave the highest grain yield and RI gave the lowest. Yield increases by R2 and R3 over R1 were 47.5% and 13.7% respectively in season 1; and 64.6% and 20.1% in season 2.The increase was particularly considerable where bitumen was used. The bitumen treatment increased yield by an average 39.9 as compared with 16.7% increase by compaction in season 1. Comparable values in season 2 were 50.0% and 20.8% respectively. c-Yield of straw:The R2 gave higher straw yield than R1 and R3 by 38.4 and 15.9% respectively in season 1, and 50.0 and 13.2% respectively inseason 2.The bitumen treatment was more effective that compaction. It increased straw yield by 40.3 and the compaction treatment increased it by

20.6% in season 1; comparable increases in season 2 were 44.6 and 15.7% respectively. d-Micro-nutrients in plant:Response to water-catchment treatments regarding contents and uptake of Fe, Mn and Zn followed a patter rather similar to that regarding plant yield. R2 showed the most effective ratio, andent, R2 ad 11.0%d 14.1%d 13.0% was morebitumen proved the most effective soil-surface tea surpassed RI and R3 by the followings: Fe: 25.3% (season 1); 34.7% and 13.8% (season 2); Mn: 25.0% (season 1); 36.1% and 17.6% (Season 2). Zn: 37.8% (season 1); 49.4% and 15.4% (season 2), Bitumen effective than compaction.4- Assessment of results of the field ex eriment contents of available micronutrients of harvest:A pattern similar to that regarding yield and micro plant occurred in available Fe, Mn and Zn in soil in ratios of water-catchment and soil-surface treatment.ardinuer croutrients in esponse to.