# Evaluation of the engineering and economical factors of the alternate sets management of sprinkler irrigation

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This study was conducted during (1995-1997) in three experimental sites.The first one, was in Bustan (sandy soil) at Nobaria area (new reclaimed lands).The second site, was in experimental farm of faculty of Agric. at Moshtohor ,Zagazig University (clay soil), and the third site, was in the experimental farmof faculty of Agric. Ain-Shams Univ. at Shalaqan (clay loam soil).Portable sprinkler irrigation laterals, with traditional (standard) andalternate sets management, were used to irrigate the experimental sites.The aims of this investigation were: -1~Studying the effect of alternate sets management on water distributionuniformity and water application efficiency2- Determining the effect of alternate sets on soil characteristics (soilaggregates break down and compaction).3-Investigating the effect of alternate sets management on crop production,water use efficiency and irrigation costThe results obtained could be summarized asfollows :~Effect of engineering factors of the alternate set management:I-The highest values of water distribution uniformity (CD) was 88% with 9x9mspacing under operating pressure of 0.3 Mpa, while the lowest value was 550/0with 18x 18m spacing at operating pressure of 0.15 MPa. The optimum (CD)was 85% for 12x 12m spacing under 0.25 MPa.2-Soil breakdown was influenced by both alternate and traditional setsmanagement. Data indicated that alternate set management reduced the soilaggregates break down (soil detachment} which improve the soil intake ratewhile the traditional set increased soil detachment. Soil aggregatesbreakdown (soil detachment) after 2 hours of irrigation amounted to 4.14%and 5.51% under 6.2 mmIh and 6.5 mmIh water application rate for alternateand traditional sets respectively.3-Soil Moisture content increased by 2% to 4 % near and around the sprinklercompared with the overlap area in traditional set system, while the soilmoisture content increased by 1% to 2% near and around the sprinklerscompared with the overlap area. On the other hand, soil salinity decreased by14.2% and 11.4% for alternate and traditional sets respectively. This meansthat the alternate sets have higher water distribution uniformity and moreeffective for salinity leaching.4. Soil compaction measurements using Recording dynamometer indicated thatless soil compaction was observed with the alternate set (0.85 N/cm2) whileit was 0.98 N/cm2 under traditional set. Surface irrigation was the highestsoil compaction since it was 1.25 N/cm2Effects of economic factors of the alternate set management:1. Alternate set increased both wheat and Faba - bean yield by 19.5 and 120/0more than under traditional set.2. Water use efficiency (kglm3) increased under alternate sets by (19.5 and11.7%) for both wheat and Faba - bean crops more than under traditionalsets.3-Irrigation cost for crop production unit (LElkg) was decreased under alternatesets by (17.5 and 6%) for both wheat and Faba-bean crops respectivelycomparing with traditional sets.The scientific results could be summarized in the following:Using alternate sprinkler irrigation set management improve water distributionuniformity and soil condition as well as increasing crop yield.