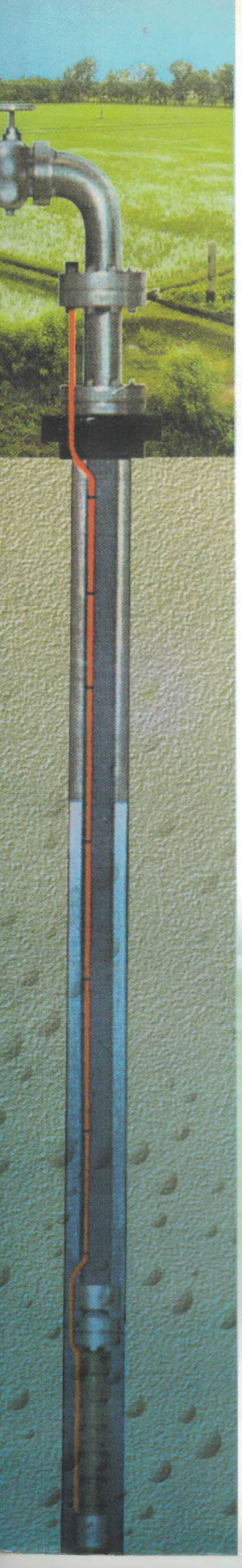

Performance Evaluation of Dug Well at RDA Demonstration Farm

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Executive summary

A dug well is essentially a well of larger diameter than that of a tube well and obtains its supply from the first water-bearing formation. It has a small discharge, about 200 to 250 litre per minute depending upon the position of static water-table and geological formation. The average discharge of a dug well is 0.004 cumec. The well penetrates 0.61 to 2.74 m below the water-table so that 0.91 to 4.57 m minimum infiltration head or draw-down is available to ensure sufficient supply during dry season. An attempt has been made to conduct a study with a view to evaluate the Performance of a dug well at RDA demonstration farm in relation to water quality for crop production, well efficiency, pump efficiency, cost effectiveness and other relative parameters.

The performance of the dug well was evaluated for both dry season (i.e. month of October, November and December) and rainy season (i.e. month of June, July and August). In the first trial during dry period, it was found that the static water table was 2.74 m in the month of October and the pump with 1 hp capacity was operated within a head of 12 to 2.6 m having discharge of 0.3 to 6.4 l/sec. It was also found that the time required for recovery and depth of water in the dug well were about constant i.e. when the required time was 6.22 hr the depth of water was 0.44 m and again, when the required time was 6.44 hr, then the depth of water was 0.40 m. In the second and third trials, the water table in the dug well was 2.70 m and 2.72 m, respectively and the capacity of pump was same. The recovery of water level was near about same as found during the first trial. Similarly, status of dug well was evaluated during rainy season. In the first trial, water table in the dug well was 0.91 m during the month of June and the pump with same capacity (1 hp) was operated by using head from 12 to 2.6 m having discharge 0.3 to 6.4 l/sec. During the rainy season, the required time of recovery and depth of water were also found to be about constant i.e. when the required time was 5.23 hr, the depth of water was 1.98 m and when the required time was 6.29 hr, then the

depth of water was 1.95 m which was both the same. In the second and third trials, the water table was 0.89 m and 0.92 m respectively and the pump capacity was same. The recovery was near about same as observed during the first trial.

From a comparative study of both seasons (dry and rainy), the water table was found very near to the ground surface (average 0.91 m below) in rainy period where as in the dry period average water level depth was 2.72 m. The recovery of dug well was found about five times high during rainy period (1.68 m depth of water) than the dry period (0.367m depth of water). From the comparative analysis during both the dry and rainy period, it was observed that dug well can produce much water during rainy period than dry period.

The chemical constituents of the dug well water were analyzed and the results have been found as : PH = 6.1, Iron = 1.71 mg/l, Arsenic = 0, Manganese = 0.2 mg/l, Nitrate-Nitrogen = 03 mg/l, Nitrite = 01 mg/l, Sulfate = 05 mg/l, Total hardness as caco3 was found 52 mg/l and turbidity was 161.77 NTU. Again, the concentrations of DTW water were also analysed and the results have been found as: PH = 7.0, Iron = 0.17 mg/l, Arsenic = 0, Manganese = 0.1 mg/l, Nitrate-Nitrogen = 1.2 mg/l, Nitrite = 01 mg/l, Sulfate = 02 mg/l, Total hardness as caco3 was found as 78 mg/l and turbidity was 1.33 NTU. In respect of water quality, the concentrations of Dug Well water were found too high than DTW water. As a result, enough nutrients can be obtained from the dug well water than DTW water and additional chemical fertilizer is not necessary if dug well water is applied in the crop field. Different crops can easily be grown in the farm using dug well water with the very low application of those parameters. It was also found that arsenic was absent and nitrite was same (01 mg/l) in both the water and total hardness as caco3 and pH in the dug well water was present in a small amount than DTW water. Acidity was low in the dug well water than DTW water. From these investigations, it can be concluded that dug well is suitable for crop production especially vegetables production in the field.