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Effectiveness of a Leaching Mitigation for Abandoned Saline Fields in Awash River Basin, Ethiopia

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In Ethiopia, furrow irrigation is one of the methods employed in the semi-arid part of Awash River Basin. However, soil salinity has increasingly become a challenge for agricultural production in the irrigated fields. Therefore, this research investigates the effectiveness of soil salinity mitigation using a leaching method on affected fields, in the Afar Regional State of Ethiopia. The aims of the study were to apply leaching mitigation for soil salinity controls and evaluate leaching effectiveness for different soil types and levels of the groundwater table. Leaching was conducted in bared part of three saline abandoned fields (Field1, Field2, and Field3). The leaching requirement levels were 0.13, 0.17, 0.2, and 0.23. The result of these experiment shows that, after days of leaching, the salinity of Field1 with sandy soil properties was significantly ($P \leq 0.05$) reduced than other fields. The Field1 salinity reduced from 16.3 to 6.2 dS/m and from 12.4 to 5.5 dS/m at depths 0-30 and 30-60 cm, respectively. For Field3, salinity was reduced from 19.0 to 12.3 dS/m and from 13.3 to 8.7 dS/m at depths of 0-30 and 30-60 cm, respectively. In some parts of Field1 and Field3, the salinity level decreased to 2.0 dS/m. However, in Field2 with shallow groundwater, the salinity levels slightly rose up after leaching from 11.2 to 12.0 dS/m and from 8.1 to 11.6 dS/m at 0-30 and 30-60 cm depth, respectively. Generally, combination use of leaching plus flushing is the effective method to reclaim saline abandoned fields, if the groundwater table is not too shallow. It the meantime, high saline contented leachate water need to collect through drainage system, and it needs to proper disposal or re-use to irrigate salt resistance crops. Otherwise, the leachate water will bring the challenge for downstream irrigation users and high saline groundwater rise up, as currently observed around the basin in Gewane swampland expansions and Lake Beseka growth.