sodic water for irrigation seems inevitable due to ever shrinking canal water supplies. A device known as water conditioner cum descaler based on the scientific principle of Magneto Hydro Dynamic Treatment (MHDT) is advocated by many manufactures to improve quality of underground brackish water. Farmers of the area have made several queries from time to time about usefulness of this device due to its high cost. A study was conducted from 2010-16 at PAU Regional Research Station, Bathinda on loamy sand soil with an aim to test the performance of water conditioner cum descaler regarding improvement in water quality; its influence on crop productivity and chemical properties of soil under cotton-wheat/*raya* cropping sequence. The experiment comprised of four treatments of irrigation viz. canal water (CW); raw tube well water (TW); purified tube well water (PTW); alternate raw tube well and purified tube well water (TW/PTW) with four replications in randomized block design. The residual sodium carbonate (RSC) and electrical conductivity (EC) of the raw tubewell water and canal water used for the study was 6.4 & 0.5 meq L^{-1}; and 2200 & 450 µmhos cm^{-1}, respectively. In PTW treatment, the brackish water is passed through water conditioner cum descaler fitted on tubewell delivery pipe. The results revealed that in cotton, treatments TW, PTW and PTW/TW produced statistically at par seed cotton yield which was significantly lower than CW treatment. In wheat and *raya*, different qualities of irrigation water had non-significant effect on grain yield. Irrigation with TW, PTW and TW/PTW exerted similar influence on pH, EC, sodium adsorption ratio (SAR) and organic carbon content of the surface layer of soil, which significantly differs from CW irrigation. The results showed no improvement in water quality parameters (EC and RSC) of PTW as compared to TW treatment and exhibited similar deleterious effect on soil properties at the termination of the experiment.

Soil solution electrical conductivity and nutrient concentration in salt affected soils under conjunctive saline water irrigation

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Abstract

In many farming situations of arid and semi-arid regions, limited availability of good quality water necessitates the conjunctive use of fresh and saline water to increase the crop yields. Assessment of the real time *in situ* electrical conductivity of root zone in salt-affected soil under saline water irrigation can help in developing proper soil-water-crop management practices. The total concentration of dissolved salts in the soil solution usually employed for measurement of soil salinity is empirical in nature and generally does not match with the electrical conductivity of the soil solution wetting the roots of the crop plant. Study analyses the dynamics of electrical conductivity (EC_{ss}) and nutrient concentration in soil solution collected from soil at field capacity after 24 h of irrigation using centrifugal filters. Soil samples were drawn from the ICAR-CSSRI Research Farm (Panipat) field under sorghum-wheat cropping system since 2014. Soil solution in quasi-equilibrium with soil solid phase was extracted and analyzed for different cationic and anionic constituents. The EC_{ss} and pH_{ss} were in the range of 3.1-42.05 dS m^{-1} and 7.61-8.56, respectively. The dissolved organic carbon (DOC) and total nitrogen in soil solution were in the range of 11.54-476.9 mg L^{-1} and 77.81-363.5

developed. Soil pH_2 was positively correlated ($r > 0.3$-0.6) with soil solution indices like sodium adsorption ratio (SAR), Na^+/K^+ (SPR), Na+/ ($Cl^- + SO_4^{2-}$) (NCSR), Cl^-/SO_4^{2-} (CSR) and DOC. Ca^{2+}/Mg^{2+} (CMR) was negatively correlated with pH_2. These findings suggests that EC_2 and SAR play important role in determining soil pH but cationic and anionic ratio also modify the soil pH at micro level. Biomass production of the salt tolerant wheat variety KRL-210 was only slightly affected by different soil solution parameters due to its adaptive mechanisms in the tested range. About 85.6% variability in DOC content of soil solution was explained by Ca+Mg, pH_{SS}, total nitrogen and $Na/(Cl^- + SO_4^{2-})$ ratio.

Temporal variations in soil nutrient dynamics of rice-prawn integration in *Pokkali* lands

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Abstract

Pokkali system of cultivation is a unique practice in many waterlogged coastal soils of Kerala. In this system, salt tolerant, tall varieties of rice are grown alternately with prawn/fish in the same field. While rice is grown during the monsoon season, prawn is cultured during rest of the year. In recent times, however, there has been an intensification of prawn culture in many areas. *Pokkali* fields are essentially wetlands subject to high tidal inundation and consequent changes in soil properties and salinity which need to be thoroughly studied. With this background, a study was conducted to evaluate the soil properties before and after rice- prawn cultivation in *Pokkali* soils. Soil samples were collected from a *Pokkali* field at Kumbalangi, Ernakulam district, Kerala where rotational rice-prawn cultivation has been carried out over the years. Samples were taken during two consecutive years *viz.*, 2014-15 and 2015-16 four times in the months of June (before rice crop), October (after rice harvesting), November (before prawn culture) and in May (after prawn harvesting). Soil pH before rice cultivation was neutral and changed to moderately acidic after rice harvest. Organic carbon content of the soil remained high before and after rice cultivation. Other major nutrients like P and K were high in content. Calcium was present in adequate amount whereas Mg was deficient. Soil sulphur levels were low to medium in the first year but high in the following year. Cu, Fe and Zn contents were adequate. Mn was adequate in the first year and deficient in the second year. Soil pH before prawn cultivation was moderately acidic and changed to neutral after prawn harvest. Organic carbon increased after prawn cultivation. Major nutrients like P and K were high. Calcium levels fluctuated within low and adequate ranges in both the years. Mg was very low while sulphur was medium to high in status. Cu and Zn were adequately present. While Fe remained high in both the years, Mn was low. Rice-prawn integration was found to be very beneficial and successful in *Pokkali* lands. In *Pokkali* cultivation, only rice panicles are harvested and rest of the plant is left to decay to provide nutrition to the prawn. Similarly, prawn excreta add to the soil nutrient content benefitting the succeeding rice crop. Based on these results, it seems that rice-prawn integration is an environmentally sustainable and economically viable method of cultivation in *Pokkali* lands. Monoculture of prawn could deteriorate soil and water quality and may result in the salinization of the area in long run.