

**Short Communication**

**Use of environmental friendly fertilizers in saline and saline sodic soils**

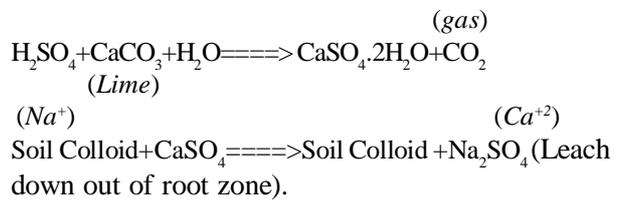
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Economics of agriculture, especially smaller farmers have been getting worse year to year. Lack of resources with government and various external factors had been limiting crop revenue potential whereas input costs have been on continuing rise. One of the way out is a new look to agronomy and soil science for increasing yield per acre at sustainable coast.

In Pakistan about 6.2 mha. land is saline. The under ground water also contains some concentrations of carbonates and bicarbonates. These carbonates and bicarbonates are harmful for young plants. If 20 liter per acre sulphuric acid or hydrochloric acid are applied as fertigation it could be saved the plants from harmful effects of salts. The acid can be applied at the time of soil preparation before sowing. This acid provides native calcium present in the soil available. In others words the acid makes gypsum available. By lowering the pH of soil, micronutrients become available to crop. It improves soil environment by reducing impact of salinity and high pH. Reduce soil compactness and enhance soil porosity by replacing sodium of soil with calcium. If brackish water is being used for irrigation the acid can be used in standing crop as fertigation. The acid should be used at 10 liter per acre in first two irrigations. Due to the application of H<sub>2</sub>SO<sub>4</sub> at 10 liter per acre in standing crop of wheat with first two irrigations as fertigation in the project area (three districts of Punjab Province) the yield of wheat was increased three times. In control where no acid was applied, grain yield per acre was only 12 mounds. The field where H<sub>2</sub>SO<sub>4</sub> was applied grain yield per acre was 35 mounds. This increase in grain yield was due to the availability of native calcium. The possible mechanism involved may be: Sulphuric acid may be used in place of gypsum in calcareous sodic soils. Sulphuric acid reacts with lime to form gypsum (CaSO<sub>4</sub>.2H<sub>2</sub>O). The gypsum formed in this reaction

has same effect as applied from outside. Following chemical reaction takes place.



H<sub>2</sub>SO<sub>4</sub> was applied on about 2000 acres in the project area (Three district of Punjab Province) and four pamphlets written in Urdu Ali and Aslam, 2002 a and b and Ali, *et al.*, 2003a and b were distributed to the farmers. On the basis of the recommendations the farmers are getting more income from the same piece of land. It is suggested that applying 10 liter per acre with 1<sup>st</sup>. two irrigations as fertigation. In two hours one acre is irrigated with canal/tubewell water. The presence of lime is important in sodic and saline sodic soils, because during the initial steps of reclamation it can provide Ca<sup>+2</sup> if it is treated with acid. When vegetation is established, the release of carbon dioxide converts some calcium carbonate into relatively soluble calcium bicarbonate [Ca (HCO<sub>3</sub>)<sub>2</sub>]. This naturally released calcium is generally available for reclaiming sodic and saline sodic soils. Apart from the balancing the nutrients requirement of the plant, the Programme is substantially save on the wastage of N and P which cost a lot in terms of nutrients not taken up by the plant. there are the trail and farmer field results of sugarcane, wheat, rice and other crops in different soil/water environment.

Although the technology approach, which is followed in new in pakistan but is not altogether alien globally. In the previous few years, in advanced agricultural countries, private company's have developed such products and are providing support services based on their R&D results. The focus will

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be on provision of services, especially on application techniques, identification of problems and looking for solutions.

It is hoped that due to the use of phosphoric acid, reclamation of saline soils is possible and per acre yield is also increased. 35 liter/irrigation phosphoric acid is used 18% cone, but Sitara Chemicals Ltd is trying to enrich this up to 36%. In 1<sup>st</sup> two irrigations i.e. only 70 liter phosphoric acid is used.

### Recommendations

In saline soils it is not recommended urea. It is recommended Ammonium Sulphate or Ammonium Nitrate. In saline soils pH is already high. When urea is applied, the pH of the soil becomes very high temporarily and due to this high pH, Urea is lost as a gas and Young seedlings die when become in contact with urea.

To minimize gaseous, losses of urea or Ammonium sulphate, when the fertilizer is broadcasted, irrigated the field soon. In this way the fertilizer is dissolved into the water and absorbed in the soil. It is not recommended spreading fertilizer in standing water. Wait till the water is absorbed into the soil, then spread fertilizer it will remain in the root zone of the plant and most of the fertilizer is available to crop.

It is not recommended phosphoric acid as fertilizer. In the experiments phosphoric acid may give more yields in all the crops as compared to DAP, single super phosphate and triple super phosphate fertilizers.

### References

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