© Sodic water RSC greater than 3.5 mel^{-1} can be use safly for the reclamation of saline sodic soil when gypsum was added to match with the requirement of soil as well as irrigation water.

→ Specific Ion Effect of Irrigation Waters:-
are as under

*Ca:-
if Ca conc. is >35% of total cations water is considered suitable for irrigation under average condition of soil & water managment.

*Na:-
If Na conc. is more than 60% of total cations H$_2$o is unfit for irrigation since it can induce K or Ca deficiency. it must be kept in mind that deterioration of physical properties of soil start much ealier than sepecific ion effect of Na on plant growth.

* Cl & SO_4:-
Conc. of these two anions strongly corelates with EC of irrigation H$_2$o about 5-10 mmol conc. /L^{-1} of becom harmful to sensitive plants. However relativly range of sensitivity to Na & Cl effects among different plants exist which is more pronounce under sprinkle irrigation Woody plants are more sensitive to Cl than annual crops. If Cl, SO_4 ratio become greater than 1/3 the water is considered more harmful than that where the ratio is 3:1 because sulphate ion

are considered more harmful for roots and disturb internal metabolism of plants, & induce precipitation of Ca as $CaSO_4$ causing a rise in soil pH and SAR which indirectly modify soil environments pertaining to unavailability of nutrients to plants

* Mg:-

High EC water in arid & semiarid conditions can contain Mg ion more than Ca ion. Mg more than 50% among Ca+Mg adversly effect the soil & plants. It has been found that Mg:Ca on exchange complex ~~actions~~ increase with an increase in Mg Ca ratio in irrigation water while with decrease with increase SAR of irrigation H_2O. The role of Mg in effecting the soil properties has been observed which is quite controversial.

* NO_3:-

In Certain area of world graind waters & agri drainage water contain variable conc. of NO_3 & generally are accompanied by K. Contineous use of high NO_3 water results in higher vegetative growth & poor grain formation in grain crops. But such water must be useful for Fodder crops high conc. of 'N' in Fodder due to NO_3 rich irrigation water. can cause NO_3 poisoning in animals.

=> Silica:-

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High conc. of silica in irrigation water may leads to hard crust formation similar to that with high RSC water and thus tend to prevents seedl emergence. Some other element like trace metals may be equally toxic for plant & soils.

-> Boron:-

B occurs in varying amounts in ground water of arid & semi arid zones. The usual range of B is 0.1-5.0 mg/L° it is essential for plant growth but is very toxic at conc. only slightly above optimum levels it means that its range b/w toxicity & deficiency is narrow for many crops therefor B analysis should be including in routine, of any appraisal of salinity & quality of irrigation water. When water of specific B conc. is use for irrigation toxicity is relativly less in fine texture than light texture soil. because of differential adsorptional characteristic of B

-> Litheum:-

Highly saline ground water have been notted to certain certain conc. of Li. The range of Li varied from 0.02 - 1.8 mg/L. Germination studies with wheat barley, rice & maize indicated increasing conc. of Li cause toxic effects. The adverse effect of Li upg is greater in root as compare to shoot. The lethal conc. of Li is much less then 5 mg/L for sensitive crops.

However grain yeild of wheat is not significantly effected 20mg/L of Li.

→ Factor Effecting water Suitability for Irrigation:-

① Chemical Composition of Irrigation water:-

The EC or TSS ~~Na~~, SAR & RSC & main Cations & anions generally determined the quality of irrigation water. In addition to specific ions under specific situation must be consider e.g NO_3 & Heavy metals

② Crops Should Be Irrigated:-

The crops are 1st & most imp factor to be considered that is tolerant to EC, SAR, metals & other specific ions. However the stage of crop growth usually younger crop plant are less tolerant as compare to older one and quantity of produce is its ultimate consumers acceptibility of heavy metals is produce (Lead, Cd, Ni, Zn, Cu, Fe, Mn, etc) Several vegetables, accumulated metals more in non-edible parts than those in edible parts except tomato colli flower where metal conc was more in fruits than shoots which ultimatly promotes metal entry in food chain

③ Soils to be Irrigated:-

Soil response to saline irrigation H_2O depends to its initial, chemical, physical properties. The nature & quantity of clay effect ion adsorption capac

which intern influence hydrophysical soil characteristic. Presence of hard layer in soils & depth of H2o level also effect H2o suitability for irrigation. ~~Amount~~ It must be kept in that saline H2o irrigation for non saline soil will salinate. Similar is the case regarding other H2o quality parameter like SAR.

4) Climate of Region:-

*Evapotranspiration & rainfall are true main element useful in evaluating water quality of irrigation. Particularly depth of irrigation strongly depends on *ET which effect irrigation regime & consequently seasonal dynamics of salt in soil profile. Generally high EC water can be use in areas where ET ~~dose~~ demand is low & rainfall is ~~low~~ more.

5) Managment of Irrigation & Drainage:-

Irrigation method, amount of i.w & soil drainage (Nature) (Surface & Sub surface drainage) bear esponsible impact e.g application of I.W in mounts less than consumptive use of ~~crops~~. water a crop will cause salt accumulation while provision of good drainage will enable the use of even poor quality irrigation water.

③ To know how farmer can manage his tube well H_2O if it is not fit.
④ To get site specific recomendation case by case

→ Sampling of Tube Well Water:-
① 30 min running
② Sample from front
③ New tube 7 Sample.
④ Clean bottle.
⑤ Cork tight & free.
⑥ Reach water Lab immediatly not more than 3 day.
⑦ Label Name, Location, date, depth.

→ Measure/Managment of Brakish Water:-
① Tube well should never be use without proper test & recomendation.
② Recomendation should be implentation with true sipirit.
③ Canal H_2O are or good quality H_2O should preferably be use during germination stage.
④ Soil should be kept level to avoid development of patchy salinity & decrease in yeild
⑤ Contineow testing of H_2O after an interval of 1-2 year.
⑥ Saline H_2O can successfully be manage by using 15-25% more H_2O then crop requirment This extra H_2O is called leaching fraction.

→ Cyclic Use of Brakish & Canal water:-

① Tubewell water of medium quality H_2O when use in cyclic manner gives very good result.
② Tubewell H_2O for rice and canal water for wheat in rice wheat rotation.
③ Tube well H_2O for cotton & Canal water for wheat in cotton wheat rotations.

4) Tube Well water for wheat & canal water for summer fodder (Sorghum & Maize)
5) Alternate irrigation of canal water after one, 2, 3 irrigations of tube well H_2O proved successful to minimize yeild losses.
⑥ Gypsum should also be applied coupled with cyclic use if SAR of water is greater than 20 and RSC greater than 3.5 meq

→ Managment of Sodic & Saline Sodic Water:-

① GR of H_2O should be calculated in Lab & recomended to farmers
② Gypsum must be applied once a year on the basis of total water use for crop rotation beieng practiced
③ H_2SO_4 can also be used if texture of soil is fine. but quantity of H_2SO_4 should not exceed 50kg/Acre.
④ Long term use of high RSC water in relativly light texture soil indicated harmful effect after 3 years. which can be successfully manage with application of gypsum, H_2SO_4 & there combinations.