

Reversing Salinity, Preserving Soil

An illustration of a man and a woman in yellow shirts and green pants, both kneeling and holding a stylized globe of the Earth. The globe shows green continents and blue oceans. The text 'Reversing Salinity, Preserving Soil' is written in a large, bold, black font, curving around the globe.

Halt soil Salinization,
boost Soil Poductivity

BY TIRUNIMA PATLE

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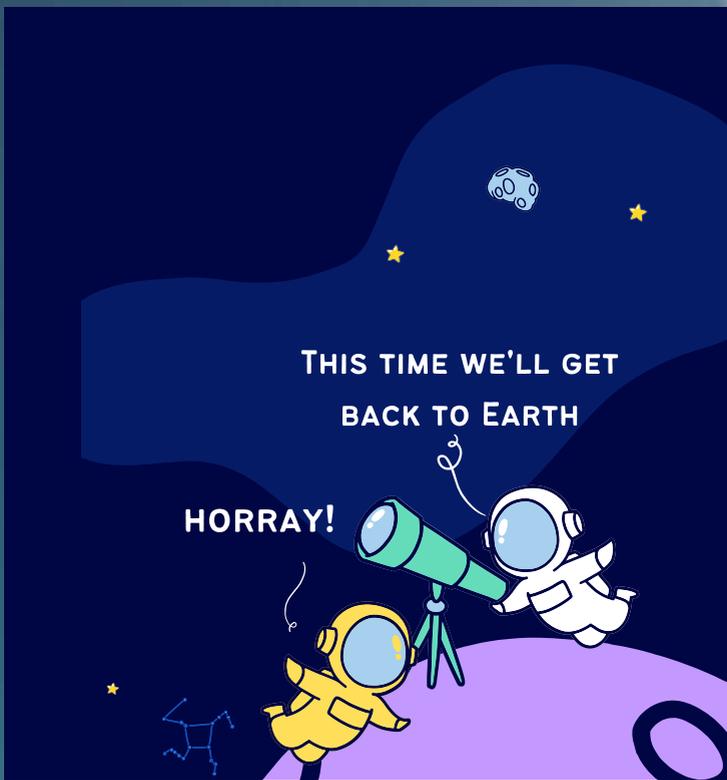
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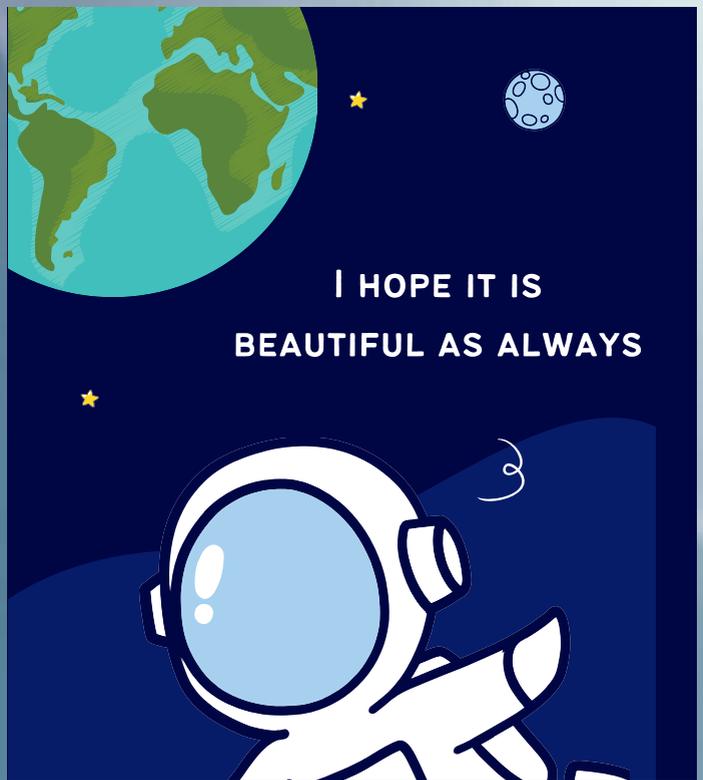
RECLAMATION OF SAS

COMPREHENSION



THIS TIME WE'LL GET
BACK TO EARTH

HORRAY!



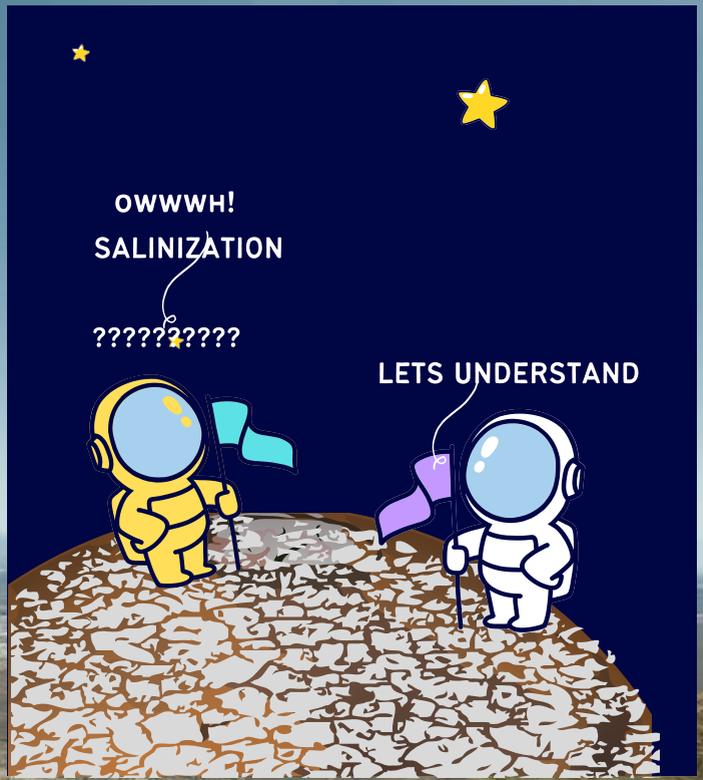
I HOPE IT IS
BEAUTIFUL AS ALWAYS



WHAT!O

WE ARE ON EARTH AND IT
IS GETTING DEGRADED
DUE TO SALINIZATION

WHERE ARE WE ???
ARE WE ON
WRONG PLANET??



OWWWH!
SALINIZATION

????? ?????

LETS UNDERSTAND



Dude , I need a
detox

SALT AFFECTED SOILS

SALINIZATION



● **SALT AFFECTED SOILS CAN BE DEFINED AS SOILS WITH HIGH LEVELS OF DISSOLVED SALTS AND/OR HIGH CONCENTRATIONS OF ADSORBED SODIUM IONS IN SOIL MATRIX**

● **SALTS ARE ESSENTIAL COMPONENTS OF THE SOIL ECOSYSTEM, BUT DUE TO CERTAIN ENVIRONMENTAL CONDITIONS, EXCESS SALT ACCUMULATES IN THE SOIL HORIZONS, WHICH LATER DETERIORATES THE SOIL'S PHYSICOCHEMICAL AND BIOLOGICAL PROPERTIES.**

● **BASED ON A SYSTEM DEVELOPED BY THE US SALINITY LABORATORY, SALT-IMPACTED SOILS CAN BE BROADLY CLASSIFIED AS EITHER SALINE, SODIC OR SALINE-SODIC.**

Soil Type	pH	EC (dSm^{-1})	ESP
Saline	< 8.5	> 4.0	<15
Sodic	> 8.5	< 4.0	> 15
Saline-sodic	> 8.5	> 4.0	> 15



EXTENT OF PROBLEM

At global level, 810 million ha is affected, by sodicity (434 million ha) and salinity (376 million ha)



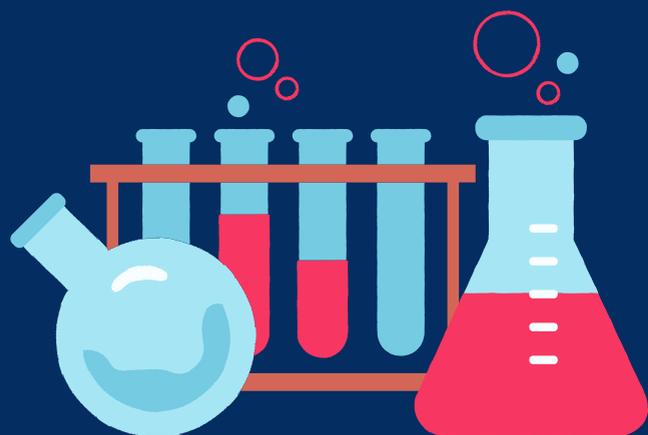
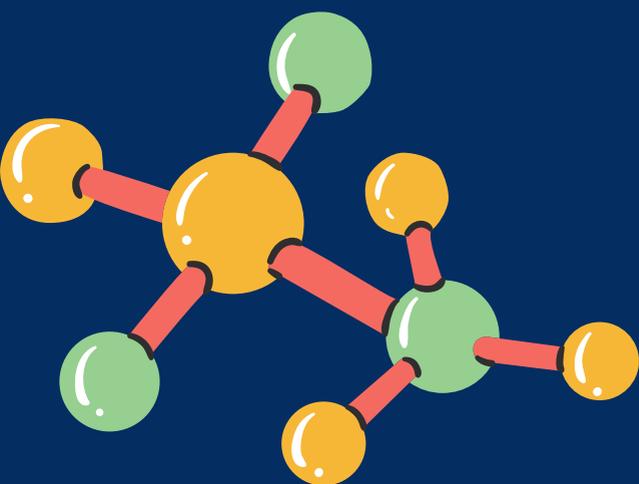
10 million ha of land are lost because of salinity caused by irrigation each year.

25 % of ground water used for irrigation is either saline or brackish

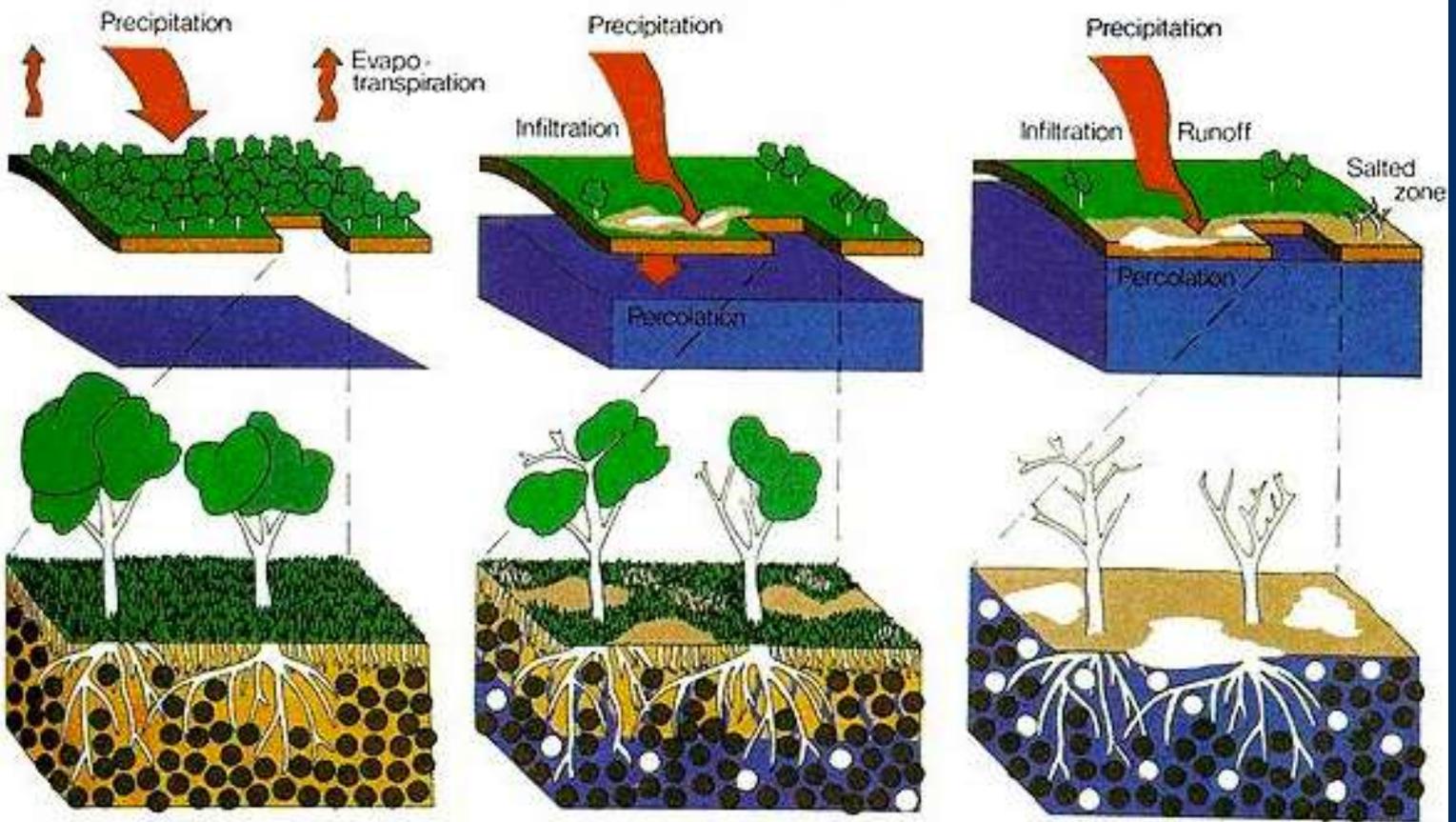
Characteristics of Salt Affected Soils (SASs)



Properties	Saline soil	Sodic Soil	Saline-Sodic Soil
pH	7.5-8.5	> 8.5	8.5-10.0
ESP	< 15	> 15	> 15
EC (dSm ⁻¹)	> 4	< 4	> 4
Salts	Chlorides and sulphates of Ca or Mg	Carbonates and bicarbonates of Na	Both
Total soluble salts	Less than 0.1 %	Less than 0.1 %	More than 0.1 %
Colour of soil	White	Black	-
Organic matter	Less	Very less	Variable
Physical condition	Flocculated , permeable to air and water	Deflocculated , very poor permeability	Depends on presence salts of Ca or Na
Other names	White alkali, Brown alkali, Solon chack	Black alkali , Typical usar, Sodic soil	Usar soil



PROCESS OF SALT ACCUMULATION ON SURFACE



Before clearing

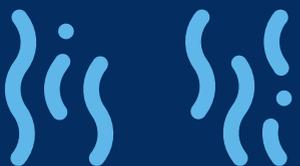
Most water is used where it falls. The system is in balance.

After clearing

Saline groundwater rises and is concentrated at the surface by evaporation. Vegetation growth is affected.

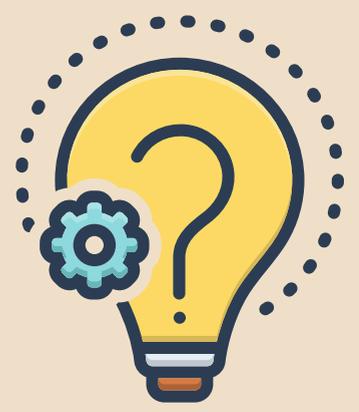
Later

Accumulation of salt at the surface kills protective plant cover. The land is open to erosion.



11
Na

20
Ca

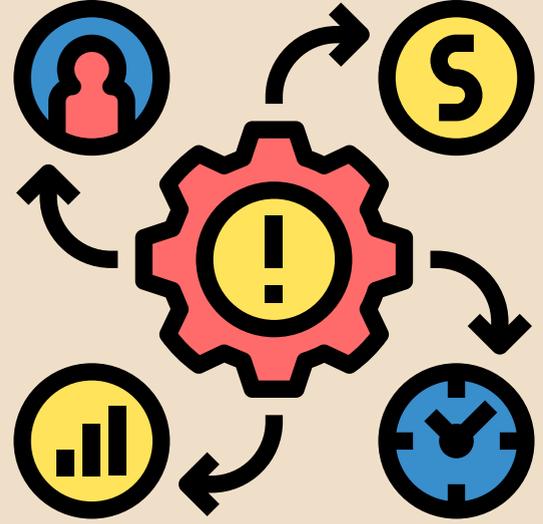


What causes Salinity?

1. Primary source of salts in soil is from rock weathering.
2. Fluctuating depth of ground water
3. In arid region less rainfall available to leach the salt and high rate of evaporation causes concentration of salts in soil at various layer.
- 4 . Coastal Area: Due to inundation of sea water.
5. Irrigation water containing high concentration of soluble salts.



Diverse effect of Salinization

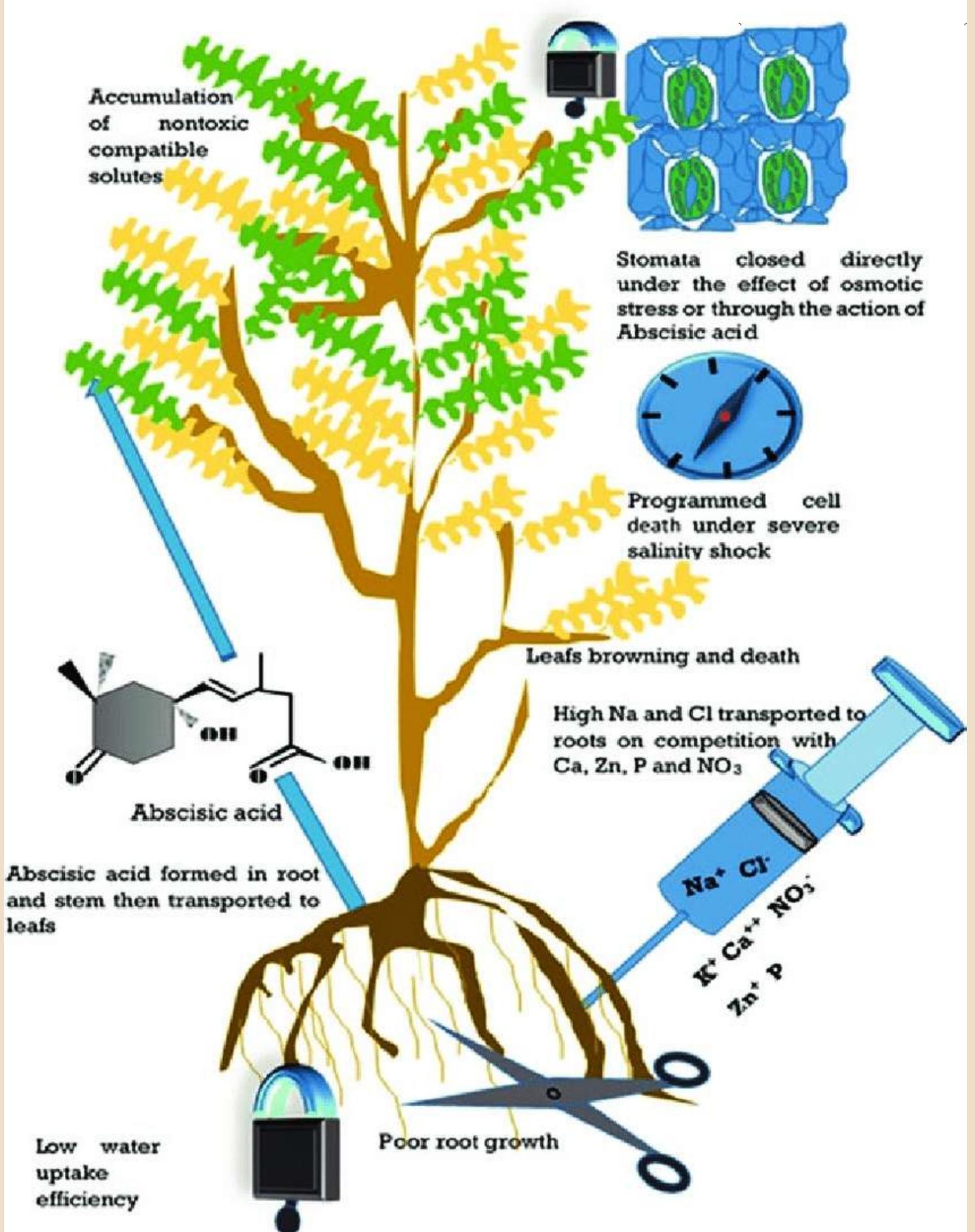
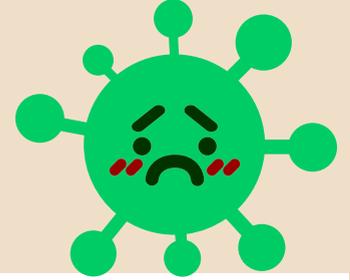


The presence of salinity in soil and water can affect plant growth in three ways:

- (1) it can increase the osmotic potential and hence decrease water availability;
- (2) it can induce specific-ion effects by increasing the concentration of ions with an inhibitory effect on biological metabolism;
- (3) it can diminish soil-water permeability and soil aeration by adversely affecting soil structure. The adverse effects of soil salinity on plant growth and productivity varies with the type of plant being grown



IMPACT OF SALINITY



HOW DO YOU DIAGNOSE SALINITY?

diagnosing high Ph , Salinity , Sodcity problems



Problems	Potential problems
 <p data-bbox="347 882 576 925">1.Sodic Soil</p>	<p data-bbox="1086 595 1198 622">POINT 1</p> <p data-bbox="874 640 1417 719">poor Drainage , black podery residue on soil surface</p>
<p data-bbox="220 1055 735 1097">2.Saline irrigstion Problem</p>	<p data-bbox="922 898 1038 925">POINT 2</p> <p data-bbox="852 1043 1110 1167">Leaf burn , poor growth, moisture stress</p> 
<p data-bbox="304 1279 627 1379">3.Saline Soil and Saline Sodic Soil</p> 	<p data-bbox="1086 1346 1198 1373">POINT 3</p> <p data-bbox="887 1391 1401 1469">White crust on soil surface , water stressed plants , leaf tp burn</p>
<p data-bbox="284 1839 671 1881">4.High pH problems</p>	 <p data-bbox="1222 1626 1334 1653">POINT 4</p> <p data-bbox="1098 1704 1430 1883">Nutrient deficieested as stunted , yello and dark green to purplish plantcy manif</p>

REFERENCES

Use this space with instructions on putting sources when needed.



HOW TO REVERSE SOIL SALINITY?



THERE ARE SEVERAL TECHNIQUES TO TACKLE SALINIZATION AND IMPROVE AGRICULTURAL PRODUCTIVITY:

INCREASE DRAINAGE FOR BETTER FLUSHING (TO REMOVE SALTS FROM THE GROUND SURFACE).

PLANT SALT-TOLERANT CROPS TO MANAGE ECONOMIC RISKS AND TO ENSURE LAND COVER.

REMOVE SALT CRYSTALS FROM THE SURFACE MECHANICALLY.

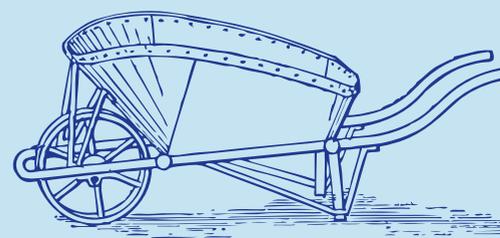
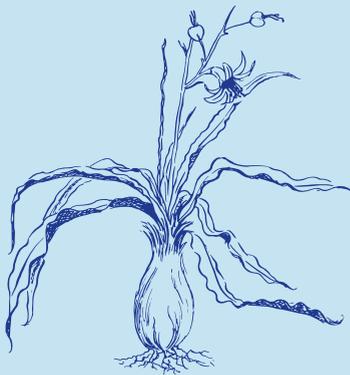
RESTORE THE BALANCE VIA CHEMICAL AMENDMENTS (E.G., GYPSUM OR SULFURIC ACID).

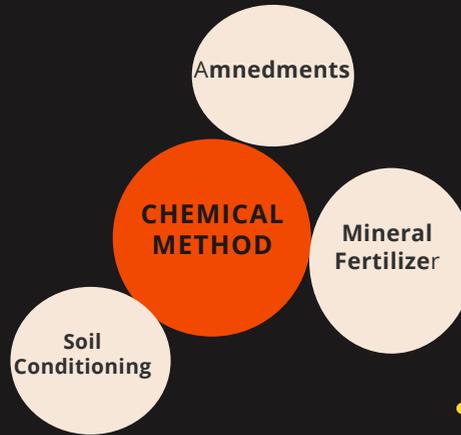
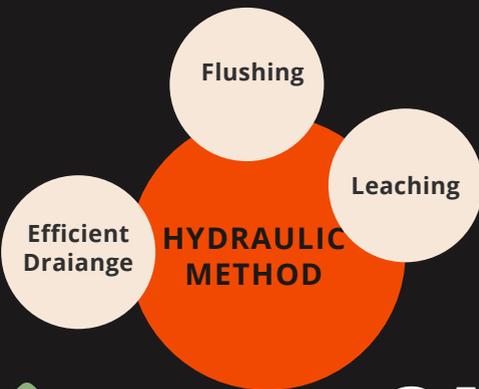
PRE-TREAT SEEDS WITH NaCl TO PROMOTE SEED GERMINATION.

REDUCE EVAPORATION WITH MULCH OR CROP RESIDUE.

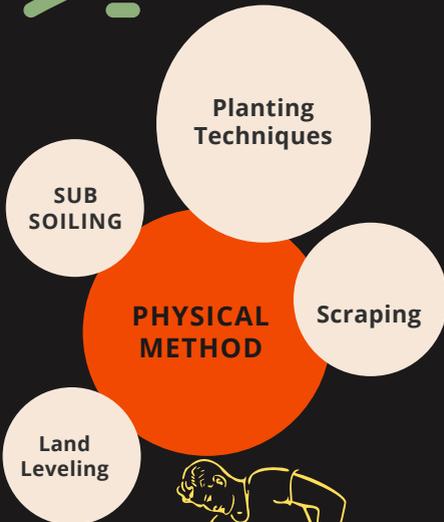
GROW CROPS THAT CAN ABSORB MOISTURE PROPERLY TO AVOID PROLONGED WETNESS OF LANDS.

APPLY FERTILIZERS RATIONALLY, AS AN OVERUSE OF CERTAIN CHEMICALS PROMOTE SALINIZATION.

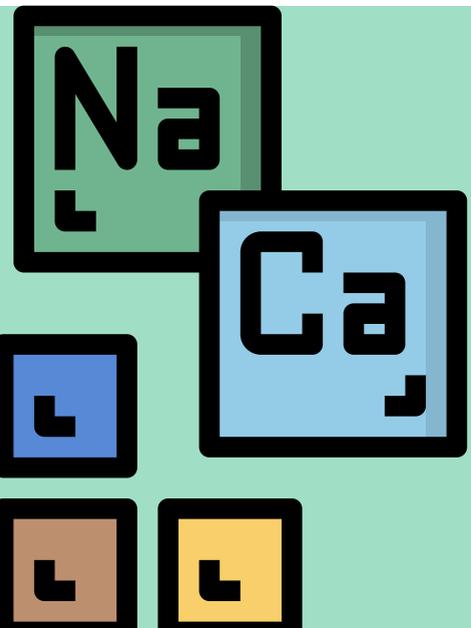
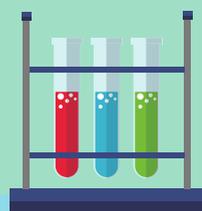
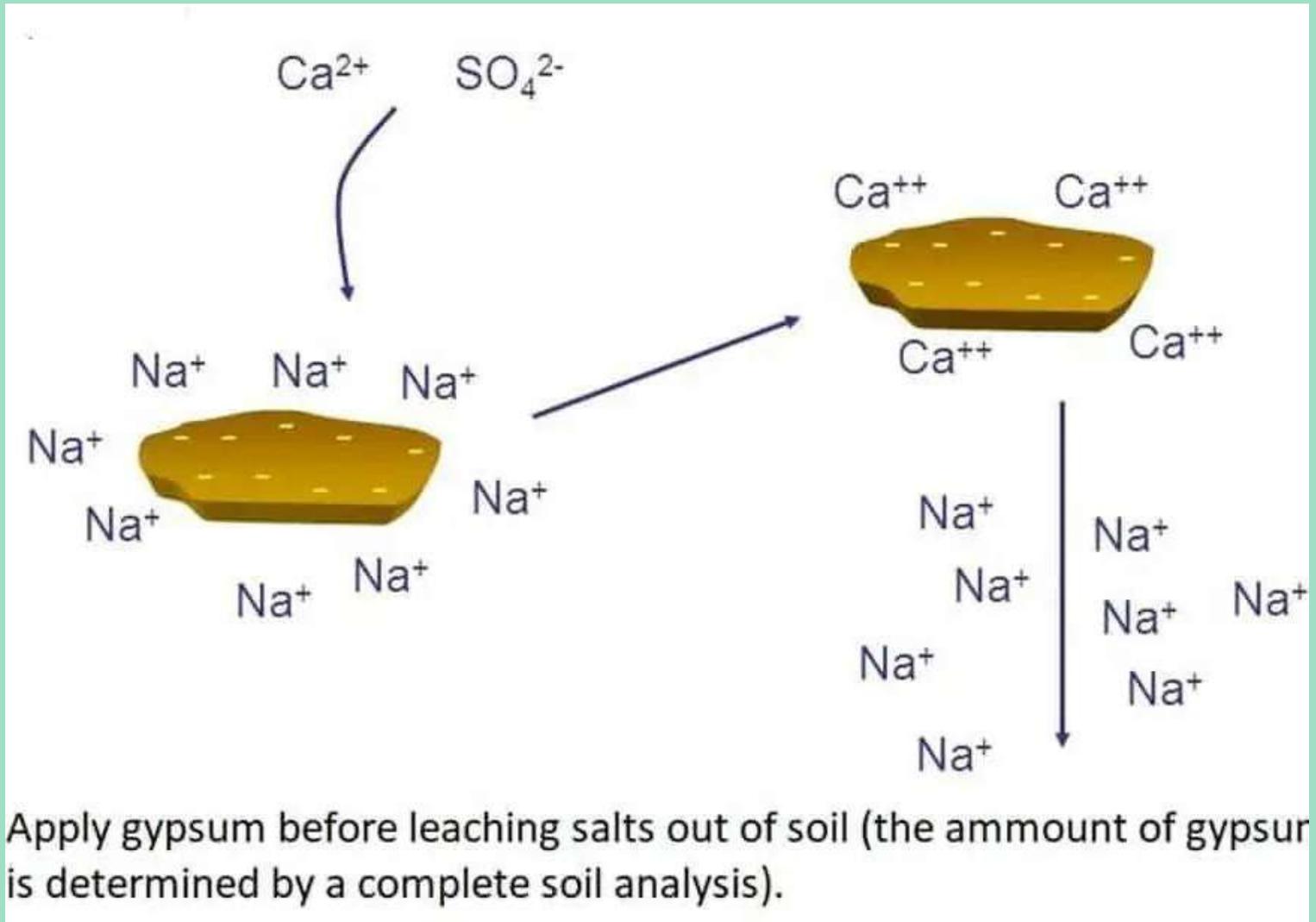
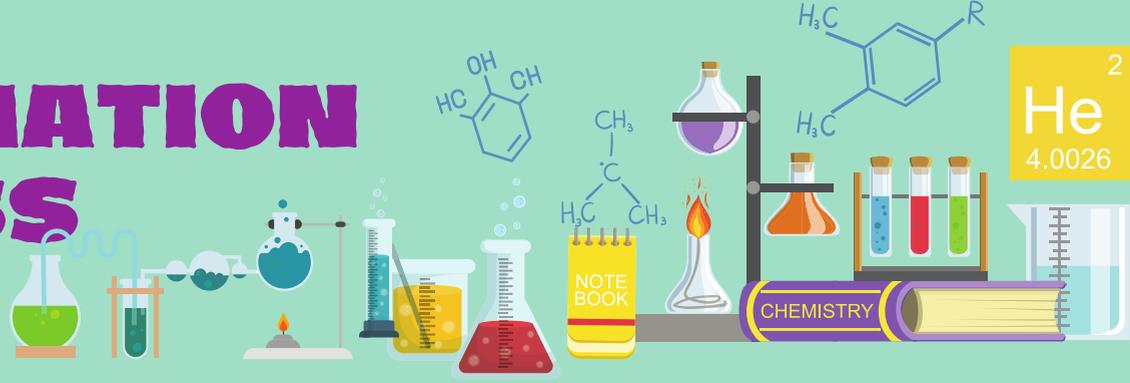


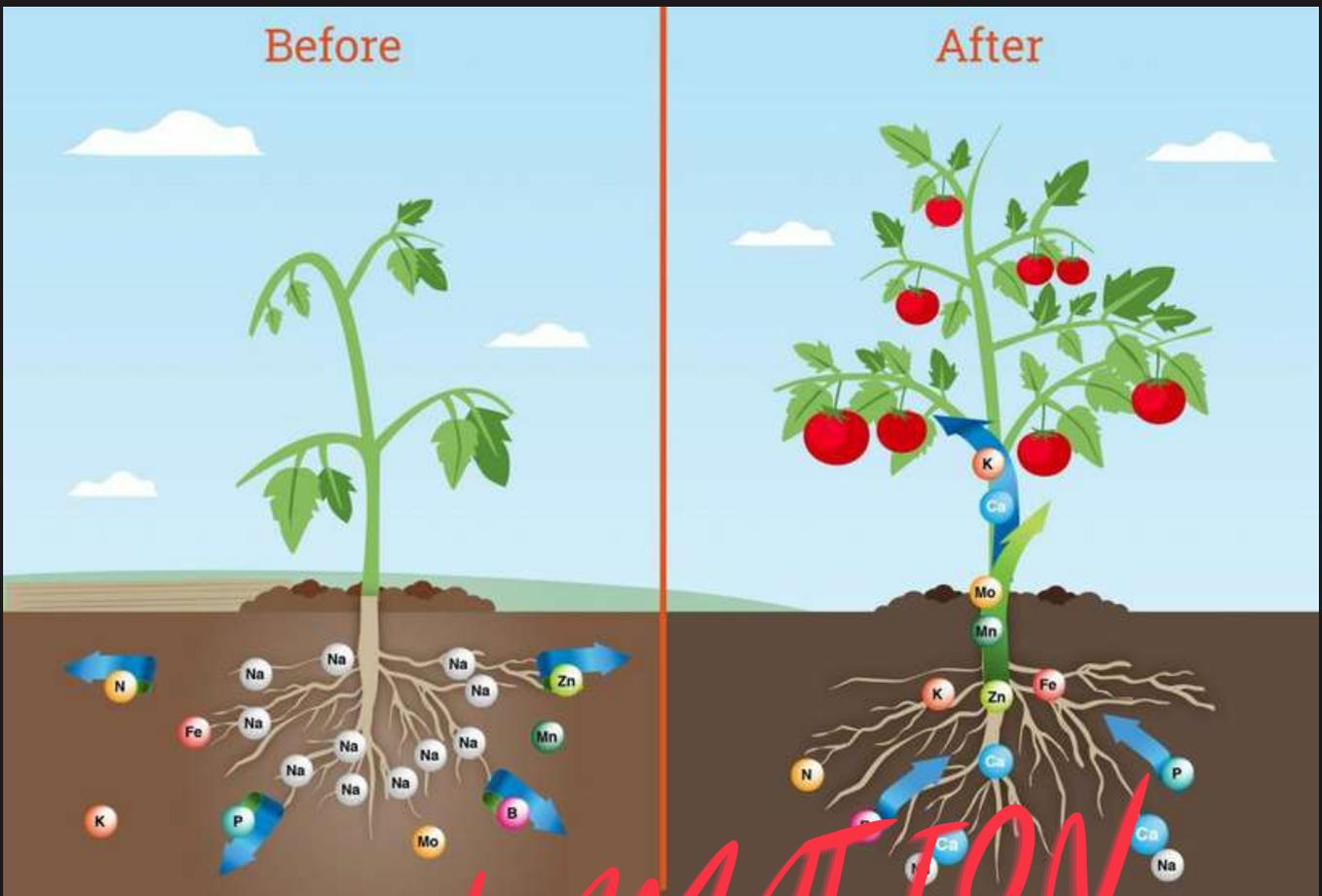


SALT AFFECTED SOILS RECLAMATION

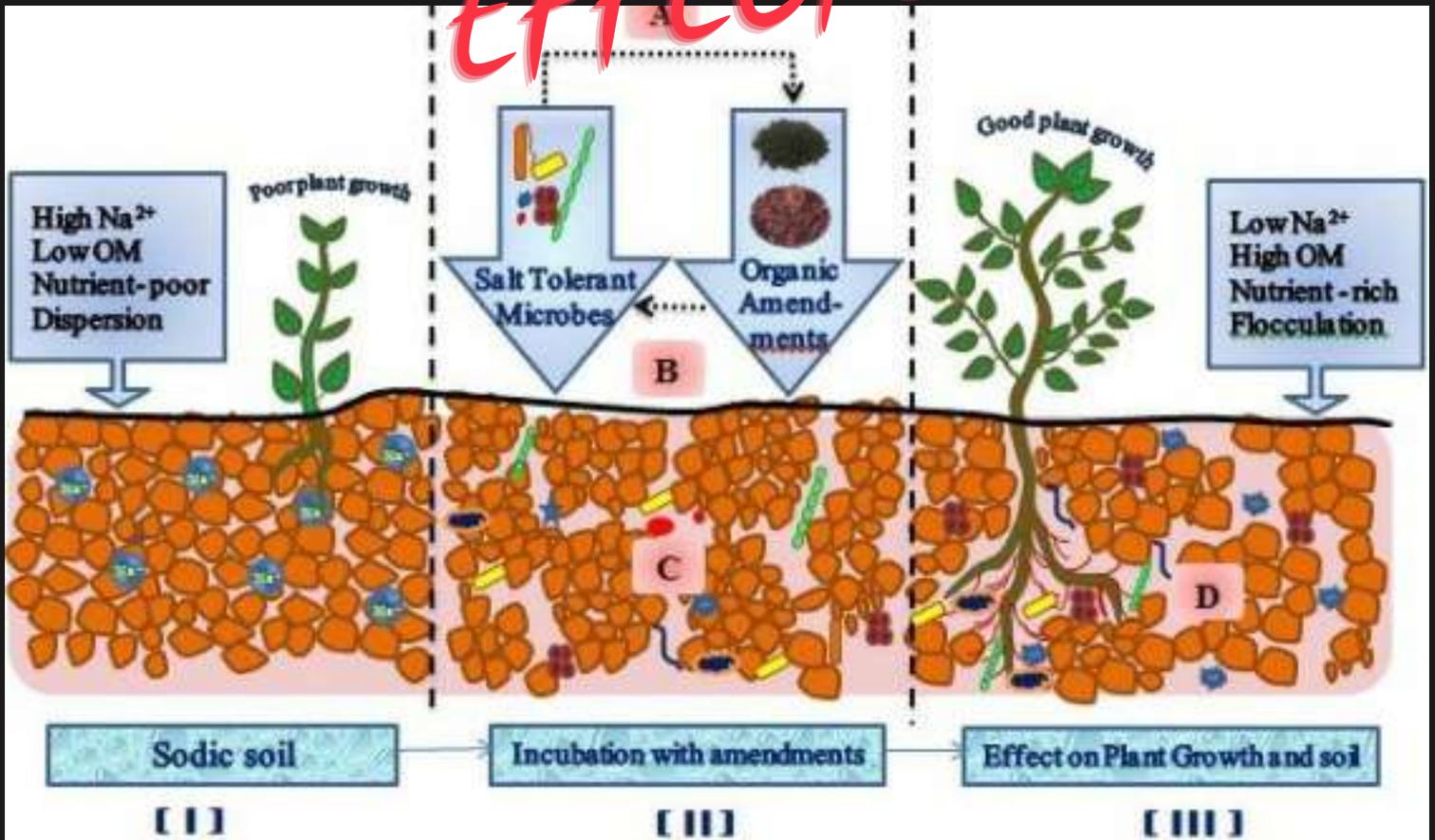


RECLAMATION PROCESS





RECLAMATION EFFECTS



Soil: Reading Comprehension

Salinization of soil is becoming a major agricultural problem worldwide, mainly in arid and semi-arid regions. The higher salinity level poses adverse effects on soil properties and plant physiology. There are two main factors of soil salinization, i.e., primary salinization by natural causes and secondary salinization by anthropogenic actions. According to the projections, it is assumed that the world population will cross 9 billion marks by 2050, which would require an increase of 57% in food production. Soil salinity is a major factor that decreases agricultural productivity and poses a challenge to the agricultural capacity to sustain an increasingly growing population. Nevertheless, elevated concentrations of salts in the soil are harmful to the soil ecosystem, which adversely affects plant physiology, microflora, and soil-dwelling organisms.

Salts are essential components of the soil ecosystem, but due to certain environmental conditions, excess salt accumulates in the soil horizons, which later deteriorates the soil's physicochemical and biological properties.

Over the years, soil salinization was not given much attention, but the reduced availability of arable landmasses and the drastic changes in the land-use paradigm has intensified the problem. The problems like food security, land degradation, desertification, unavailability of arable lands, etc. have emerged issues related to social conflict for natural resources. New Journal Pre-proof Journal Pre-proof requirements are emerging out due to burgeoning population demands, that every patch of land must be used according to the best-suited purpose and with best transformations dealing with adaptive, feasible and sustainable techniques. Numerous research shows the deleterious effects of salinity on soil properties, microflora, seed germination, plant growth, and soil-dwelling organisms. In the presence of these deleterious effects, it has been a challenge for the agricultural system to meet the current and future global food demands and ensure food security. Many soil salinity alleviation techniques are traditional and have gained popularity, but they are not perfect for solving overall problems induced by salinity to the agricultural sector. Considering contemporary issues, modern techniques are coming up with new advancements to ensure efficient, feasible, and sustainable saline soil management approaches. Out of the available management techniques, some focus on enhancing plant properties (seed priming, afforestation, crop selection, genetic improvements, agroforestry), some are well focused on enhancing soil properties (chemical amendments, biochar, earthworms, and their vermicompost, compost, microbial inoculants, electro remediation), and some techniques enhance both soils as well as plant properties in a synergic manner. Despite emerging modern techniques, there is a need for more in-depth researches which are synergic, integrated, and more sustainable to cope with the salinity issue. These emerging strategies will help in attaining some of the major goals of the UN-SDGs like goal 2 (zero hunger), goal 8 (recent work and economic growth), goal 12 (responsible consumption and production), goal 13 (climate action), and goal 15 (Life on land). In conclusion, the integrated approaches may result in better agricultural output and economic profit.

Soil Salinity: Reading Comprehension

Using sentences, answer the following questions based on the information given.

1. What are the two main factor of soil salinization

- _____
- _____
- _____

2. Importance of Salts

3. Explain Salinization

4. What are the types of Soil Salinization

5. what arerthe strategies for attaining major goals of the UN-SDGs
