INTRODUCTION
Large terrestrial areas of the world are reported to be affected by salinity. Salinization of non-irrigated soils is now a serious problem in many areas of the world. Millions of hectares of land throughout the world is too saline to produce economic crop yield. Generally, salinity is known to pose problems to agriculture and is usually confined to arid and semi-arid regions where rainfall is not sufficient to transport salts from the plant root zone. Such areas comprise nearly 25% of the earth's surface (Throne and Peterson, 1954). A recent survey indicated that the irrigated areas of 103 countries totaled to about 203 million hectares (Anonymous, 1970). If 25% of this land is saline, then there are 50 million hectares of irrigated salt-affected soils. In addition, there are large areas of non-irrigated salt-affected soils. Therefore, the salinity problem in agriculture is extensive and important.

The term salinity refers to the occurrence of various salts in soil or water in concentrations that may interfere with the growth of plants. Sodium chloride is sometimes the dominant salt present but the term includes chlorides, sulphates and bicarbonates of sodium, calcium, magnesium and potassium. Plants growing under such saline environment showed reduction in growth and
yield. Legumes were reported to be sensitive to salinity. The level and nature of salts have been found to affect leguminous plants differently in their growth and metabolism.

In the present study the plant species *Macrotyloma uniflorum* (Lam) Verdc. (*Dolichos biflorus*) var. VZM 1 (horsegram) and *Phaseolus aureus* Roxb. var. PS 16 (greengram) belonging to sub-family papilionaceae of family Fabaceae were selected. These plant species are extensively cultivated as dryland pulse crops in semi arid regions. Further horsegram assumes importance in dryland agriculture because the crop comes up reasonably well in drought prone areas in very poor soils where other crops invariably fail. According to recent sources (Balasubramanian and Venkateswarlu, 1985) in India horsegram is cultivated on an area of about two million hectares and the total annual production is about 0.65 million tonnes, whereas for greengram the total area and annual production are about 2.7 million hectares and about 1.1 million tonnes respectively. Although there are many reports on the salinity effects on crop plants including pulses, little information is available on the effect of salt stress on horsegram. The present investigation, therefore was aimed to have comparative study on the effects of NaCl
and \( \text{Na}_2\text{SO}_4 \) on certain physiological and biochemical processes during germination and early seedling growth of the two plant species namely horsegram and greengram.

Salt stress inhibits growth throughout the plant life cycle, but seed germination is generally the most sensitive stage. It adversely affects seed germination, seedling growth and plant development. Further legumes are reported to be more sensitive to salinity (Sheoran and Gary, 1979 a,b; Kumar and Gary, 1980; Levitt, 1980). Salinity effect on seed germination of different plant species has been reported by many investigators (Strogonov, 1964; Chaudhuri and Wiebe 1968; Sharma et al., 1971; West and Taylor, 1981; Verma, 1981; West and Francois, 1982; Imamul Huq and Larher 1983 a; Bal and Chattopadhyay, 1985; Younis et al., 1987). The different types of salts were found to affect the plant growth and metabolism differently (Strogonov, 1964; Poljakoff-Mayber and Gale, 1975; Levitt, 1980).

The first effective increment of salinity for a given crop, generally retards the germination with little or no effect on the ultimate number of seedlings which emerge out. Higher levels of salinity aggravate the delay in radicle emergence and retard the final per cent germination.
Abel and McKenzie (1964) showed that germination of different cultivars of *Glycine max* (L.) Merill was retarded at low external salt concentrations and was reduced at higher concentrations. The salts in the medium may cause osmotic or specific ion toxic effects on the germinating seeds resulting in reduced or retarded germination (Ayers, 1952; Younis and Hatada, 1971; Waisel, 1972).

A wide range of variability in salt tolerance was reported in a number of species (Maas and Hoffman, 1977; Shannon, 1978). Differences in salt tolerance occurs not only among genera but among different species of the same genus.

Kumar et al., (1981) have studied the germination of 12 varieties of barley (*Hordeum vulgare* L.) at different levels of NaCl, NaHCO₃, Na₂SO₄ or CaCl₂ and reported that the percent germination progressively decreased as the level of salinity increased up to 20 m mhos electrical conductivity level in all the varieties. Similarly Mukhiya et al., (1981) reported that an increase in the salinity level progressively reduces the germination of wheat, barley and soybean and was completely inhibited
with 20 mM concentration of NaCl in soybean and at 500 mM concentration in barley.

Different types of salts showed different effects on germination of seeds. Chaudhuri and Wiebe (1968) compared the influence of NaCl and CaCl$_2$H$_2$O on germination of *Triticum vulgare*. Sodium chloride was found to approximately double the osmotic pressure of CaCl$_2$H$_2$O and NaCl was found to be more effective in reducing the germination percentage.

Yadav *et al.*, (1975) found significant differences in the germination response of nine varieties of guar, *Cyamopsis tetragonoloba* when subjected to electrical conductivity levels from 0 to 11 mmmhos/cm. They found that the relative toxicities of salts of sodium in descending order were chloride, carbonate and bicarbonate. But Hyder and Yasmun (1972) found that *Sporobolus airoides* tolerated up to 275 meq/l of NaCl, but beyond this concentration germination was ceased. They reported that the magnesium, potassium and calcium chlorides were found to be more toxic than sodium chloride.

The inhibition in germination processes by salt stress is well documented and both osmotic and specific
ion effects have been shown to be involved in this processes. Chatterton and Maskell (1969) suggested that the decrease in per cent germination due to salinity may be due to decrease in the rate of water uptake as a result of osmotic effect and toxic action of the accumulated sodium ions. Hadas (1975) also showed the decreased germination rate in leguminous seeds and reported that the decrease in germination is due to the effect of low water potential on enzyme activity and not necessarily due to the lower water uptake.

It was also reported that the adverse effect of salinity is due to specific effects of the individual ions (Bresler et al., 1982; Jen and Rajpurush, 1982). A few investigations have been made to study the salt toxicity or osmotic effects on decreased germination rate in different plant species by using an electrolyte (NaCl) and a non electrolyte (PEG 6000).

Manohar (1965) studied the influence of osmotic agents including glycerol, mannitol, PEG and NaCl on the germination of *Pisum sativum* var. Meteor. He reported that the germination response to osmotic stress indicates
that NaCl was toxic and recovery treatments in water produced no new germination. PEG at higher osmotic stress was found to be more toxic than the permeating osmoticum, but on recovery treatments with distilled water, there was high recovery ranging from 54 to 74% germination. Further he found that the glycerol had no influence in reducing germination and mannitol was intermediate in response between glycerol and NaCl.

Sharma (1983) compared the effect of NaCl and PEG 6000 on germination of wheat and reported that the PEG 6000 induced osmotic stress was more detrimental than isoosmotic levels of NaCl.

Bal and Chattopadhyay (1985) have reported that the per cent germination of rice was decreased with the decrease in osmotic potential by both NaCl and PEG 6000 solutions. But they have observed the greater inhibition in per cent germination under NaCl than PEG 6000 and reported that adverse effect of NaCl on germination was due to specific ion effect rather than to osmotic effect.

Several investigations have demonstrated that the seeds of many halophytic species germinate under fresh water
conditions and at salinities below 0.5% NaCl, indicating that these seeds do not require low water potentials for germination (Waisel, 1958; Ungar, 1962; Boorman, 1968; Seneca, 1969; Lesko and Walker, 1969; Amen et al., 1970; Macke and Ungar 1971; Williams and Ungar, 1972; Chapman, 1974; Paul Reddell et al., 1986; Naidoo, 1987).

From the above literature it may be stated that the salt stress adversely affects the germination. The lower levels of salinity delay the germination and higher levels, in addition, reduces the final per cent germination. It is also clear that wide differences exist in the germination response of various genotypes of crop plants to salinity.


Strogonov (1964) reported 50% inhibition in the growth of tomatoes grown on soil containing 0.1% chloride.
Yermanos et al. (1967) studied the effect of soil salinity on the development of young Jojoba plants. The salt treated plants differed from the control only during the second year of their development. Similarly Benzioni (1970) found that the NaCl treatment did not affect the growth of Jojoba seedlings grown for 3 months.

Nodulated stages of plants are reported to be more susceptible to salt toxicity than the pre-nodulated stages of plants (Wilson, 1970). The level and nature of salts have been found to affect leguminous plants differently in their growth and metabolic processes (Imbamba, 1973; Winter and Lauchli, 1982; Nukaya et al., 1982 a,b; Imamul Huq and Larher, 1983 a,c and 1984). Similarly, varying salt sensitivity in different species of Trifolium has been reported by West and Taylor (1981) and Winter and Lauchli (1982).

West and Francois (1982) reported that the vegetative growth of cowpea was reduced by increasing electrical conductivity of the soil saturation extract beyond the threshold value. Further, Mukhiya et al. (1981) reported that the shoot growth was more inhibited than root growth. An increase in the root:shoot ratio was reported in wheat, barley and soybean plants when
grown in different concentrations of NaCl.

Similarly Alka et al., (1981) reported that a gradual decrease in shoot and root length was observed as the level of salinity increased from 4 to 20 mmmhos/cm of electrical conductivity levels. Their data indicated that the length of both shoot and root decreased at 16 to 20 mmmhos/cm electrical conductivity levels in all varieties.

It was also reported that NaCl in the growth medium within the range of 10 to 20 mM may be favourable for Phaseolus aureus, inducing some kind of stimulative effect of Na via an osmoregulatory role (Imamul Huq and Larher, 1983 a). Bhivare and Nimbalkar (1984) showed that the overall growth of Phaseolus vulgaris cv Vagnya decreased due to NaCl and Na$_2$SO$_4$ salinity but Na$_2$SO$_4$ at electrical conductivity level of 2.5 and 5.0 dS/m was found to be stimulatory.

Therefore, general growth reduction under higher salinity regimes has been reported for several plant species including legumes, and it is clear that the different salts affect the plant growth differently.
Several investigators studied the dry mass accumulation of plants in relation to salt tolerance. Balasubramanian and Sinha (1976) have observed that the dry mass accumulation in leaves, stems, roots, nodules and whole plant decreases with the severity of salt stress in cowpea and mungbean. Similarly West and Taylor (1981) showed a linear decline in dry matter yield with increasing electrical conductivity for all *Trifolium* cultivars studied.

Gary and Gary (1981) reported that the fresh and dry weights of shoots and roots of mungbean decreased by salt treatment. But the significant reduction was observed at 3 and 6 mmmhos/cm electrical conductivity level where they found that the weights were less than 50% as compared with control values. Further they reported that the NaHCO$_3$ was more depressive than Na$_2$CO$_3$ at 30 days and NaCO$_3$ becoming equally or more depressive than NaHCO$_3$ at 60 days of growth.

Increasing salt concentration did not always reduce the fresh and dry weights of plants. Imamul Huq and Larner (1983 c) have studied the salt tolerance of cowpea and mungbean and reported that the fresh and dry weights of shoots and roots of cowpea were higher than
those of control plants up to 75 mM NaCl treatments, and further they found that the fresh and dry weights of shoot and root were slightly decreased at 100 and 150 mM NaCl treatments. But in mungbean they showed a gradual decrease in fresh and dry weight of shoot and root with increasing NaCl concentration.

However, Bhivare and Nimbalkar (1984) showed that the dry matter production was more reduced in NaCl than in Na$_2$SO$_4$ treated French bean plants. Similarly Joshi (1987) observed more inhibition in drymass accumulation in NaCl than in Na$_2$SO$_4$ treated Cajanus cajan.

From the preceding reports it is clear that the dry mass accumulation in salt stressed plants decreased with the intensity of the stress and nature of the salts.

Salt stress in glycophytes induce some kind of water deficit in the expanded tissues (Greenway and Munns, 1980) causing growth reduction. Imamul Huq and Larner (1984) reported that the relative water content (RWC) was lower in the leaves of salt stressed plants (NaCl and CaCl$_2$) than in those of control. They reported that
the water deficit induced by salinity was not the principal cause of growth reduction under salt stress and it may be due to the ion toxicity.

Survival of plants under saline conditions depends on their ability to maintain normal level of metabolic activities (Bernstein, 1964, 1975a). Salinity causes an upset in water balance and variations in metabolic processes in plants. However in some plants these are very often accompanied by structural adaptations (Waisel, 1972). Similarly salinity influences the morphological characters and nutrient distribution of the plants (Stroyonov, 1964).

Salinity is known to disturb the carbohydrate metabolism in plants. Sugars have been found to accumulate under salt stress conditions in order to maintain turgor.

Rao et al., (1980) showed the lower level of reducing sugars and starch and higher levels of non reducing sugars in cotyledons and embryonic axis of NaCl treated seedlings of Phaseolus radiatus. Imamul Huq and Lerner (1983b) reported that the total soluble sugars were slightly decreased in shoots and roots of
Phaseolus aureus up to 50 mM NaCl treatments but maximum increase in their levels were found in their shoots at 150 mM NaCl treatments. Similarly increased level of free sugars with increasing salinity both in shoots and roots was reported by Imamul Huq and Larner (1984) in cowpea seedlings exposed to different NaCl salinity regimes. Joshi (1984) reported that the level of reducing sugar was higher than the level of total sugars and starch in the leaves of pigeonpea treated with NaCl or Na₂SO₄.

Furthermore the major soluble carbohydrates such as fructose, glucose, myo-inositol and sucrose were reported to be increased in leaves of NaCl treated tomato plants (Sacher and Staples, 1985).

From the preceding reports, it is clear that the different soluble carbohydrates accumulate in plants under salt stress conditions. It is also clear that salts in the medium disturb the carbohydrate metabolism leading to the accumulation of various carbohydrate fractions in plants.

A good deal of work was done regarding the effect of different salts on the qualitative and quantitative
changes in enzymes involved in carbohydrate, nitrogen and nucleic acid metabolism during germination and seedling growth of different plant species (Sarin and Narayanan, 1963; Weimberg, 1970; El-Fouly and Juny, 1972; Greenway and Osmond, 1971; Prisco and Vieira, 1976; Huber et al., 1977; Prisco et al., 1981).

Sheoran (1980) showed the influence of different salts such as NaCl, KCl, Na₂SO₄ and K₂SO₄ on the amylase activity and reported that the activity was decreased in the cotyledons and increased in embryo-axis, roots and leaves. Further, he found that chloride salinity increased the amylase activity more than sulphate salts did. However, Oyra and Baijal (1982) reported that the increase in salt concentration of the external medium resulted in a decrease in the activities of alpha-amylase and protease in two varieties of Sorghum.

In contrast, Dubey (1983) reported that alpha-amylase and phosphatase activities were increased consistently in NaCl stressed rice seedlings. However, it was reported that both NaCl and Na₂SO₄ salinity inhibited the amylase activity and stimulated starch phosphorylase activity in the cotyledons of horsegram during early period of germination (Sudhakar et al., 1987).
From the reports it is clear that the differential response in the activities of hydrolytic enzymes has been observed in different plants with different salts.

Salinity found to affect the rate of respiration of plants. One of the dominant theories explaining the general stunted growth in response to salinity relates growth reduction to the diversion of available energy from accumulative growth to maintenance. Energy requirements were assumed to be increased due to the pumping of ions against electrochemical potential gradient and also to the rebuilding of organelles and protein units, whose rate of disruption may be increased by the presence of high concentrations of electrolytes (Poljakoff-Mayber and Gale, 1975).

Higher concentrations of NaCl have often but always been reported to increase the rate of respiration of roots and other tissues (Nieman, 1962). Similar observations were also made by several investigators (Rains, 1972; Lapina and Bikmukhametova, 1972).

Similarly, Divate and Pandey (1981) reported that the rate of respiration was increased by various salt treatments and maximum rate of respiration was recorded
at the highest level of salt concentration in three cultivars of grapes. But Younis et al., (1987) reported that the rate of respiration differs with time and plant species by salt treatments.

From the reports it is clear that under saline conditions plants require more energy for pumping ions against electro-chemical gradients and for maintenance, this energy appears to be supplied by an increase in the rate of respiration.

The common effect of salinity is a decrease in photosynthesis per unit leaf area in many plant species. This has been reported by number of investigators (Gale et al., 1957; Lapina and Papov, 1970; Hoffman and Phene, 1971; Lapina and Bixmukhametova, 1972). In contrast to this, in halophytes low concentrations of salt were found to enhance the photosynthesis (Gale and Poljokoff-Mayoer, 1970). In general photosynthesis is reduced in proportion to salt concentration.

Huber and Sankhla (1979) studied the effect of sodium chloride on photosynthesis of *Lemna minor* L. and reported that the plants grown in the presence of salt
showed increased activities of PEP-carboxylase, NADH-specific malate dehydrogenase, NADPH-specific malic enzyme, RuBP carboxylase and ribulose-5-phosphate kinase. But the activities of NADPH-specific malate dehydrogenase, NADPH-specific glyceraldehyde-3-phosphate dehydrogenase and NADH-specific glyceraldehyde-3-phosphate dehydrogenase were found to be unaffected.

Crops grown under saline environment exhibit disturbed metabolism. Among crops, legumes are unique because they meet their own nitrogen requirement by fixing atmospheric nitrogen through symbiosis. Therefore their productivity depends on their nitrogen fixation potential in unfavourable environment.

The level and nature of salts in the external media have been found to adversely affect the leguminous plants differently in their growth, nitrogen metabolism, nodulation, nitrogen fixation and in the accumulation of various organic and inorganic solutes (Imbamba, 1973; Salasubramanian and Sinha, 1976; Winter and Lauchli, 1982; Nukaya et al., 1982 a,b; Imamul Huq and Larner, 1983 b, c, 1984; Gornam et al., 1985, 1986). Many reports indicated that the salt stress delays the nodule formation, decreases the number and weight of nodules and
inhibits the nitrogen fixation (Wilson, 1970; Balasubramanian and Sinha, 1976).

Imamul Tuq and Larher (1983 b) reported the higher levels of both soluble and insoluble nitrogen in NaCl treated plants of Phaseolus aureus and the accumulation of these nitrogen fractions was found to be more in the roots than in shoots. However, NH$_4$ was found to be accumulated with increasing external salt concentration in the tissues and attained toxic concentrations at higher levels resulting in an increased accumulation of total ureides. Similarly Garg et al., (1984) reported that the salt stress increases the nodule number, dry weight and nitrogenase activity per plant in both cluster bean and moth bean.

Helal and Menjel (1979) studied the uptake and turnover of labelled nitrogen. They reported that NaCl has no major effect on the total nitrogen content whereas K induced a pronounced increase in the total nitrogen content of shoots and roots of barley plants. Protein nitrogen content was found to be decreased by NaCl and the decrease was more in the shoots than in roots. This decrease in protein nitrogen due to NaCl was paralleled by a remarkable accumulation of inorganic nitrogen. Similarly
Imamul Huq and Larner (1984) showed an increased level of total nitrogen in shoots of *Vigna sinensis* with NaCl treatments up to 50 mM, while in roots this increase was observed up to 75 mM. Similarly, soluble nitrogen content increased up to 50 mM in both shoots and roots.

Joshi (1987) studied the effect of soil salinity on nitrogen metabolism in *Cajanus cajan* L. and reported that the total nitrogen content was found to be higher under NaCl than under Na$_2$SO$_4$ salinity. The nitrate reductase activity was found to be accelerated with NaCl; while Na$_2$SO$_4$ had an adverse effect on it.

Similarly, Lai and Bnardwaj (1987) reported that salinity disturbed the nitrogen metabolism leading to a decrease in total and protein nitrogen but the soluble forms like nitrates and ammonia-nitrogen were found to be increased and nitrate reductase and glutamate dehydrogenase were suppressed.

However Rao et al., (1981 b) studied the effect of salinity on the activities of aspartate amino transferase, alanine amino transferase and glutamate dehydrogenase in the leaves of peanut and reported that the soil salinity
(NaCl : 35 meq/l) increased the activities of the three enzymes at all stages of leaf growth. These enhanced activities were found to play a role in the conversion of certain ketoacids into aminoacids in the presence of accumulated ammonia under saline conditions. Similarly, Sharma and Garg (1935) observed the enhanced activities of these three enzymes in the roots and leaves of wheat under NaCl salinity.

From the reports it is clear that the salinity affect the nitrogen metabolism differently by accumulating various nitrogenous compounds and altering the activities of the different enzymes of nitrogen metabolism.

The accumulation and transport of the low molecular weight organic compounds were reported to be either as compatible solutes or as stress markers (Hsiao, 1973; Stewart and Larher, 1930; Imamul Huq and Larher, 1983 b). In higher plants, the organic osmo-regulate solutes have been found to be either nitrogenous compounds such as amino acids and betaines or various carbohydrates and polyols. Nitrogenous materials found to be predominate in grasses and certain halophytic dicots while carbohydrates are most common in glycophytes.
The accumulation of the imino acid, proline in the free uncombined form is a characteristic response of many plants to many types of stress (Aspinall and Paley, 1961). It is well known that salt stress gives rise to proline as well as glycine betaine accumulation in plants (Stewart and Lee, 1974; Chu et al., 1976; Storey et al., 1977; Storey and Wyn Jones, 1977, 1978 a,b; Wyn Jones and Storey, 1978; Hanson and Nelson, 1973; Tal et al., 1979 a,b; Prasad et al., 1980; Dix and Pearce, 1981; Rao et al., 1981 a; Josni, 1984; Forello and Rice, 1986, Cusido et al., 1987). Proline accumulation was also reported in several plants experiencing moisture deficit caused by salinity (Bal, 1976; Singh and Rajyopal, 1978) or by drought (Hsiao, 1973; Paley and Aspinall, 1981) or by low temperature (Palfi and Junasz, 1970).

Major roles have been suggested for accumulated proline in plants during stress. Barnett and Naylor (1965) and Stewart et al., (1966) suggested that the proline may act as a storage compound for energy and reduced nitrogen and carbon to be used during post stress metabolism.
But Stewart and Lee (1974) have suggested that the proline may act as a cytoplasmic osmoticum counteracting the effect of salt accumulated in the vacuole.

Generally free proline accumulation in plant is considered to be a non specific response to the decreased water potential. But under salt stress it is reported to be a salt specific response (Chuanan et al., 1983).

The quaternary ammonium compounds, especially glycine betaines was found to be accumulated in many plant species under salt stress conditions (Stewart and Lee 1974; Storey, et al., 1977; Storey and Wyn Jones, 1978 b, c; Hanson and Nelson, 1978; Imamul Huq and Larner, 1983 b; Grattan and Grieve, 1985; Gornam et al., 1985). The accumulation of betaines may help the plants to maintain turgor under stress conditions.

Plants growing under saline conditions showed marked changes in the nucleic acid and protein metabolism. The direction of these changes found to depend on the nature of the plant as well as on the kind and concentration of salt (Strogonov, 1964).
Chloride salinization markedly decreased the DNA and RNA contents in kidney bean leaves. Similarly Garg and Garg (1982) reported that the DNA and RNA content was gradually decreased in the leaves of maize with increasing salt concentration. Further Na$_2$CO$_3$ was found to be more detrimental on nucleic acid content than NaHCO$_3$.

Gomes Filho et al., (1973) studied the effect of NaCl salinity in vivo and in vitro on RNase activity in the cotyledons of Vigna unguiculata and reported that the DNA and RNA contents were decreased from 3rd day to 7th day and the RNase activity was found to be increased in salt stressed cotyledons which may be due to the activation and/or de novo synthesis of the enzyme.

The chief control mechanism under salinity is the selectivity of ion transport. Plants are known to absorb essential ions from a saline medium dominated by non essential (toxic) ions. Several reports have been made on the accumulation of various inorganic mineral elements in plants exposed to different types of salts (Strogonov, 1964; Poljakoff-Mayber and Gale, 1975, Levitt, 1980).
Favourable and adverse effects of salinization on the absorption of various ions were also well documented. Effect of salinity on potassium content was favourable (Mciri et al., 1971; Joolka et al., 1977; Bhivare and Nimbalkar, 1984; Nigwexar and Chavan, 1987) as well as adverse (Hajrasuliha, 1980; Starck and Kozinska, 1980).

Kumar (1984) studied the salt tolerance of Indian mustard, *Brassica juncea* L. and reported that accumulation of Na was more in sensitive group than in tolerant group. Similar observations were also made by Sharma et al., (1984) in wheat varieties and reported that the poor performance of the salt sensitive variety under NaCl was due to excessive accumulation of Na and Cl ions and the better performance of the salt tolerant variety was because of its success in osmotic adjustment without exposing itself to excess of ions.

The presence of high sodium in the external media was found to lowers the Na/Ca ratio and such a situation gives rise to a passive accumulation of sodium ultimately causing an ion excess effect (Greenway and Munns, 1980; Imamul Huq and Larner, 1984). This is thought to be the primary reason for growth reduction and changes in chemical
composition of higher plants under saline conditions. It was reported that the differences in salt tolerance between species of Casuarina appear to depend on differences in ion uptake and distribution in individual organs of the plant (Clemens et al., 1983; Aswathappa and Bacnelard, 1986). The highly tolerant species of Casuarina found to accumulate little Na and Cl ions in their shoots and their concentrations decreased from old to young growing needles (Aswathappa and Bacnelard, 1986).

From the literature cited above it is clear that the plants under salt stress conditions show reduced growth, decreased fresh and dry weights, lowered water content, increased respiration rate and accumulation of various organic and inorganic solutes. Though a few investigators concerned with the physiological and biochemical parameters, a wide gap still exists regarding the adaptive and tolerant potential of plants under salt stress. In the present study, therefore, an attempt is made to understand the effect of NaCl or Na$_2$SO$_4$ salinity on certain physiological and biochemical processes during germination and early seedling growth of two important semi arid leguminous plants, horsegram and greengram.