

Is drip irrigation viable in Hambantota District:

Some food for thought

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by Dr. N. Senanayake B.Sc
(Agric), Ph.D

Irrigated agriculture can be considered as one of our ancient cultures. Its unique features such as designing and durability of systems are praiseworthy even today. In the ancient past the rain water that fall on to this noble land is never reached its ultimate destination, the sea, without serving the Sri Lankans either for agriculture and/or for their domestic use. The ancient civilization had a network of reservoirs overflowing from one to another and ultimately reaching the sea after serving the mankind. However, in the recently developed Irrigation projects planners and/or implementers have made enough mistakes so that the projects are not able to commission hundred percent. Two good examples could be given. One is the left bank of Uda Walawe Irrigation project where the land area at the tail end is not receiving the projected results.

The impression of old settlers as to the reason behind this is, that the proposed course of the (upper part) left main channel was changed subsequently, because of a politically well-connected businessman was in the danger of splitting his property in to two sections. Hence he was able to convince the politburo to redirect the channel away from his property which resulted in the lowering of heading capacity of the lower reservoirs by about 10-12 feet. The other example is the Kirindi Oya Project, which was built after destroying a large network of small tanks which was functioning in the area, and the reservoir cannot be filled to its capacity due to less rainfall on the catchment area. Here again the project planners' illusion by the incorrect data given to them on rainfall, evapotranspiration etc. at planning stages.

Though we are very conversant in irrigated agriculture we do still make wrong conclusions probably because of wrong consultations and or political interference. Irrigation per se is supposed to provide the water requirement of cultivated crops, replenish the evaporative demand of the exposed surface and the water table, maintain proper soil structural conditions for deeper and better root development. It also help the plants for adequate nutrient absorption through releasing the fixed and adsorbed minerals and bringing them to equilibrium state with the soil solution by the natural forces acting in the soil. It helps to wash out the excess soil nutrients, which comes up along with the capillary flow due to evapo-transpiration pull from the exposed soil surfaces. There are several

methods of providing irrigation water to the crop. They could be divided broadly in to three: surface irrigation, overhead irrigation and sub surface irrigation and each of these methods in turn can have several application methods.

These methods on the other hand has their own deficiencies and efficiencies. Choosing the correct method for a particular situation depend on the efficiency factors, source availability and most importantly the micro environment where it is applied to have a very efficient application method. For example an overhead irrigation method, namely sprinkler irrigation cannot be used in an environment where the ambient temperature is very high and the small water droplets gets evaporated before reaching the soil surface. In the same way surface flood irrigation may be of little use in a very sandy soil and percolation rate is very high for which situation a frequent sprinkler irrigation method is more beneficial.

this method of irrigation and a project proposal is underway to implement it in the Hambantota district. Further, scientists have predicted scarcity of water in the world not only for the irrigating purposes but also for domestic use. This could be further aggravated by the global warming which processes will increase evapo-transpiration demand for water. Hence this move by any country is commendable in order to use the scarce resource very efficiently.

In this method of irrigation water which will carry through pipes laid out in the field is applied to the base of the crop itself with special nozzles which drip the water to the plant base. Thus the daily requirement of water is given to the plant at a rate less than the percolation rate though there is still water movement within the soil by mass flow and water potential gradients acting within the soil mass. In other countries, it is a very popular method in green houses and in the field, it is always combines with mulching. However, as any other

gation method for a particular environment should be done based on its merits and demerits.

Sri Lanka is an island and the Hambantota is the driest southern district where the annual rain fall is less than 800 mm per year. Ten year average annual rainfall is 1139 m.m. It lies

are therefore threatening as there is a possibility of developing salty conditions, if no adequate irrigation is carried out to bring down the calcium carbonate that moves up to the upper layers. Thus, crop intensification in the area should go hand in hand with adequate irrigation facilities also.

Character	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Wind velocity (km/hr)	6.6	5.6	5.7	4.7	5.7	6.7	7.1	8.2	8.0	6.2	4.6	4.4
Temperature OC	31.5	32.7	33.6	33.8	33.6	32.9	32.5	32.7	32.3	31.0	30.2	30.8

within the 30 m MSL contour which also refer to as the coastal plain. Therefore, the water table in the area is also fairly high (close to the root zone) and invariably salty due to the sea water around. Being in the coastal belt the area also affected by the high tide and low tide all round the year. With the global warming there is also a possibility of rising mean sea level which could aggravate the situation further in the near future. Further the ambient temperature is also high in the area (32.3OC) as a result of which the evapo-transpiration demand is high. Figure below gives the comparison of the water inflow/outflow over the year (ten year averages at RARDC, Angunukolapalessa).

The figure shows that the monthly rainfall will exceeds the evapo-transpiration demand only in three months (one month very marginal) of the year and in nine months of the year there is a deficit of water, which will be countered by the water available in the lower soil layers (water table), if no irrigation is provided. Water in the lower soil layers moves upward through capillary movement due to the transpiration pull which invariably carry the soluble salts and deposits in upper soil layers as the water gets evaporated from the soil surface.

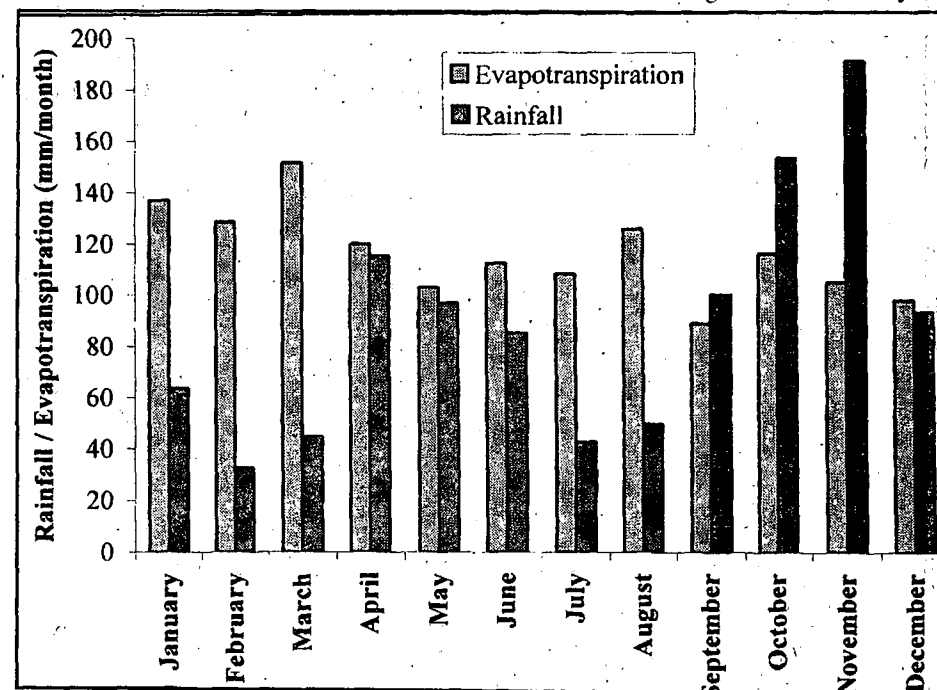
This upward movement of the salts could be washed down only during two months of the year. Another important yearly phenomenon in the area is the salt influx which will carry to the land mass by the 'land-ward wind movement' during the day. Further if one to study the soil types available in the district, specially in the major irrigation project Kirindi Oya Irrigation Project, the low humic gley soils found in the moderately flat lands or bottom lands which drain the peneplained land surface are characteristically greyish in colour and the sub soil consist of calcium carbonate concretions 2 to 3 feet below the soil surface. The Siyambala series of this soil group has been also identified as solodized solonetz and is generally unsuitable for most type of cultivation. This soil types

The table below also shows the other important climatic parameters, which have their effects by increasing the evapo-transpiration, demand, thus, depleting the water availability and hence the water balance in the area as a whole. The high wind velocities in the area, during the yala or dry season are popularly known as the 'kachchan winds' because of its dryness. Hence, the drip irrigation per se has to be carried out at a high rate of application especially in the dry season.

Recommending drip irrigation in the field in the Hambantota district is risky and therefore should practice much more cautiously as there can be detrimental and suicidal results in the long run. It may be lucrative in the short run but with the changes that could occur in the soil catena over time, salinity and/or alkalinity could even lead to the abandoning of the whole land mass from agriculture.

If one to use drip irrigation in the area it should be done with some sort of mulching to curtail the salt movement upwards which practice is going to be very expensive and/or the mulching materials are unavailable. Otherwise, the salts in the lower layers of the soil will move up and their deposit in upper layers near the root zone could results in the development of salinity/ alkalinity. This may not happen in two- three years and will take still a greater period of time depending upon the microclimatic conditions; high temperature, high wind velocity etc. in the area. Add to this, problem is that in Sri Lanka we do not have research data on drip irrigation and also the salt movement within the soil catena for any part of the country. Hence the decisions were to be taken haphazardly through trial and error which may not be conducive for a high cost involved project implementation.

(The author is the former Deputy Director (Research) at RARDC, Angunukolapalessa)



Drip Irrigation

Drip irrigation is one of the available overhead irrigation methods. The salient feature in this overhead irrigation method is the very high resource use efficiency or more properly, the water use efficiency and application efficiency. However, the overhead costs are high in this method and the farmers in the third world countries cannot afford or very few could effort. Therefore-state intervention is inevitable if one to popularize this method. In Sri Lanka there appears to be a recent trend in advocating

irrigation method, it also has its limitations on application such as high capital cost though water application efficiency is very high. Further, it emphasizes on the water requirement and the transpiration demand of the crop assuming the evaporation demand in the soil is minimal because of mulching and there is no percolation loss. Thus in the field it could be used as a supplementary irrigation method with mulching or in areas where there is a good water balance (inflow/outflow) through out the year. However, in general, selection of an irri-