**Drip irrigation Design**

**ABSTRACT**

Irrigation is a technology that ensures a good soil-moisture balance resulting into a good environment for crop growth. Irrigation has not been embraced in Kenya in large scale except for the well established canal irrigation systems like in Mwea, Ahero, Bura that came into existence way back. However organizations such as KARI and AMIRAN have tried to come up with affordable drip irrigation systems for which small scale farmers have been able to take up. This project focuses on design of a drip irrigation system in Namekhele area in Tongaren location, Bungoma North sub-county. The area experiences a bimodal rainfall pattern however, for the second season the received rainfall cannot support crop production (as evidenced by rainfall data from Lugari farmers training centre) thus the farmers have to source for food stuffs from the neighboring counties.

The specific objective will entail determination of pertinent parameters for the design, coming up with the system layout to ensure every farmer gets water and sizing of the pipelines. The crop water requirement for the crops selected was estimated using the Penman Monteith method after incorporating CLIMWAT data into CROPWAT using climatic data for Kakamega station number 2318 and was found to be 4.8mm/day and 4.2 mm/day for sweet potatoes and kales respectively. Irrigation scheduling and frequency have been calculated based on the CWR.

Irrigation frequency was found to be 2 days and time of operation of system was found to be 36 minutes for s/potatoe area and 31 minutes for kales. The layout of the area was drawn from Global Earth guided by topography, land use and existing infrastructure. Blocking of the area was done (dividing the area into manageable portions) for supply of water through distribution lines. The conveyance was designed for a total length of 4065m with a diameter of 327mm, the mainline runs for 1270m with diameter ranging from 150- 188mm. Each distribution line serves as follows: D1-1-1 an area of 8.14 ha with a length of 442m, D1-1-2 an area of 6.56 ha with a length of 382m, D1-1-3 an area of 23.31 ha with a length of 661m, D1- 2-1 an area of 9.93 ha with a length of 278m, D1-2-2 an area of 12.09 ha with a length of 528m. F21/1723/2010 Page xii In estimation of the various pipe line hydraulics excel spreadsheet was applied together with cad tools. For the design of the infield system, hydro-calc software was used to come up with the various pipe sizes and classes which were, 59.2 mm Class B for the sub-mains and 20 mm diameter for the drip lines, the emitters chosen are pressure compensating to ensure same discharge whichever the pressure range at an operating flow rate of 1.6l/hr. The application rate for the system was found to be 8.89mm/hr with an irrigation interval of 2 days..