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EFFECT OF IRRIGATION INTERVALS ON GROWTH AND YIELD OF CLUSTER ONION IN NON-CALCIC BROWN SOILS

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EXTENDED ABSTRACT

Cluster Onion (*Allium cepa* L.) is a bulbous crop cultivated in almost all over the world. Even in Sri Lanka it's a very popular crop that is broadly cultivating in northern and southern regions. In Sri Lanka, cluster onion has cultivated in 4872 hectares with total production of 63,037 tons red onion bulbs (Agstat, 2015). Non-Calcic Brown soil is a sandy soil having a sand percentage of around 90% and less water retention ability, around 10.10% available water at the surface layer according to Mapa and Bodhinayake (1988). Therefore, frequent irrigation is required for any crop grown in this soil. Most of the red onion cultivating farmers irrigates fields every day. Application of water frequently to the crop is always increase the cost and increase disease incidences. Therefore, this study was conducted with the objective of finding the appropriate irrigation interval for cluster onion in Non-Calcic Brown soil to enhance the water productivity while reducing the cost for irrigation.

A field experiment was carried out at Regional Agriculture Research and Development Centre, Aralaganwila in 2012/13 *Maha* and 2013 *Yala* seasons in Non-Calcic Brown soil. The treatments were allocated in 3X 1m plots with three replicates.Each plot was separated from 1m width space and a polythene was laid between the plots up to 50 cm depth to avoid the lateral movement of water from plot to plot. Irrigation intervals were selected as one, two, three, four and five days and amount of water irrigated was determined according to the evaporation data. The amount irrigation for each interval was calculated based on climatological approach using the crop coefficients (Kc) for cluster onion and daily evapotranspiration data.

Gravimetric soil moisture content was determined at 0-20cm depth class prior to each irrigation and Soil bulk density was determined. Soil moisture depletion's were determined using those data. The irrigation water use efficiency (IWUE) also calculated.

Vegetative growth parameters and Yield parameters were measured and compared statistically using SAS software.

According to growth data, there's no significant difference in No of bulbs/ cluster and height of plants. Only in 2013 *yala* season number of bulbs/cluster have reduced in 5 days irrigation with compared to one day irrigation interval at maturity stage. In both *maha* and *yala* seasons there's no significant difference among the treatments in yield however in maha season there can be an affect from the rains. In *yala* season highest mean yield of 15.85 t/ha and highest IWUE was observed in three days irrigation interval treatment. Mean cluster onion yield was reduced by 37% (5.88 t/ha) and 32% (5.04 t/ha) with the increase of irrigation interval from 3 days to 4 days and 3 days to 5 days respectively.

Hanson *et al.* (2007) has reported that approximate allowable soil moisture depletion for onion is 25% and Maughan *et al.* (2015) also reported that the amount of allowable depletion for onions is about 25 to 30% of the total available water in the soil. In this study the volumetric soil moisture depletion level was 20% with three days irrigation interval (Figure 1). Therefore, three days irrigation interval is optimum to avoid moisture stress to the plant.

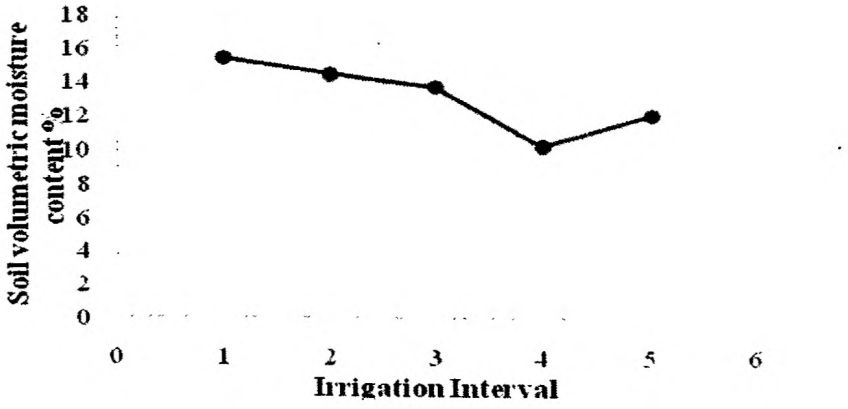

Figure 1: Average Soil volumetric moisture contents % day before irrigation in all observations with different irrigation intervals

It has being recorded that farm gate price of red onion in 2013 was Rs. 124.27/kg (AgStat, 2014). Economic return was calculated using above figure under different treatments. When considering the results in *Yala* season which is least affected by rainfall, the gross income is reducing by about Rs. 7,00,000.00/ha when increasing the irrigation interval from 3 days to 4 and 5 days. When increase irrigation interval by a day

labour cost for irrigation is also reducing. With considering yield parameters, soil moisture depletion levels and economic returns, three days irrigation interval is the most suitable. Therefore, irrigation interval can be increase up to 3 days without affecting the crop yield while increasing the water productivity and can reduce the cost of cultivation of cluster onion in Non-Calcic Brown soils.

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