

Short Communication

DETERMINATION OF EVAPO-TRANSPIRATION OF RICE FOR DIFFERENT AGRO-ECOLOGICAL ZONES IN SRI LANKA

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INTRODUCTION

Water is an essential input for rice cultivation and its supply in adequate quantity is important for maximum rice production. Water requirement for rice cultivation should be known before irrigation scheduling in irrigated rice and it is necessary to find out the best period for rice cultivation under rainfed as well. Total water requirement for rice is primarily depend on evapo-transpiration of rice crop (ET_{rice}), seepage and percolation losses (FAO, 1977). Seepage and percolation losses differ with the soil type of the particular paddy field while evapo-transpiration (ET_{rice}) varies with the growing stage of rice crop and the climatic conditions (FAO, 1977). Climatic conditions are varying in different agro ecological environments and as a result water needed for better crop production is also varying across different rice growing environments. Therefore, rice establishment should be planed with the minimum evapo-transpiration to save water and to maximize the rice production. This study was conducted to find out the amount the water loss through evapo-transpiration of rice crop (ET_{rice}) in different agro ecological zones, where rice can grow in *yala* and *maha* seasons.

MATERIALS AND METHODS

Evapo-transpiration of rice crop (ET_{rice}) = ET₀ x K_c. ET_{rice} represents the crop evapo-transpiration or crop water need in mm/day while ET₀ representing potential evapo-transpiration in mm/day. K_c is the crop factor which depends on type of the crop, growth stage of the crop and the climate (FAO, 1986). Potential evapo-transpiration (ET₀) data for different agro-ecological zones were collected using the available literature (Munasinghe and Chithranayana, 2004). K_c values reported for *maha* season are 1.1, 1.05, 0.95 and for *yala* season are 1.1, 1.25, 1.0, representing 1st and 2nd month, mid season and last 4 weeks, respectively (FAO, 1977). Dates of sowing were selected on weekly basis for 3½ month rice varieties from 4th week of August to 1st week of December for wet season and from 1st week of March to 4th week of May for dry season to find out the minimum evapo-transpiration of rice crop (ET_{rice}). Standard deviations of

minimum ETrice were calculated for mid country Wet zone (MCWZ), low country Wet zone (LCWZ), up country Intermediate zone (UCIZ), mid country Intermediate zone (MCIZ), and low country Dry zone (LCDZ) and those were used to calculate average ETrice. Maps of ETrice for *yala* and *maha* seasons were prepared assigning the values for the particular agro-ecological zone.

RESULTS AND DISCUSSION

ETrice of 3 ½ month rice varieties vary from 251 to 522 mm for *yala* season and from 198 to 344 mm for *maha* season. Figure 1 shows the evapo-transpiration of 3 ½ month rice in different agro-ecological zones and districts. In the *yala* season, DL3 and DL4 agro-ecological zones show the highest ETrice value during the vegetative, reproductive and maturity phases, and values are 206 mm, 174 mm, and 142 mm, respectively. Minimum values of ETrice 112 mm, 78 mm, and 61 mm were recorded for the above phases in IU3d agro-ecological zone. During *maha* season, ETrice in vegetative, reproductive and maturity phases were 158 mm, 93 mm, and 93 mm respectively in DL2a agro-ecological zone while minimum ETrice for the above phases were 87 mm, 52 mm, and 53 mm in IU3d agro-ecological zone (Figures 2 and 3).

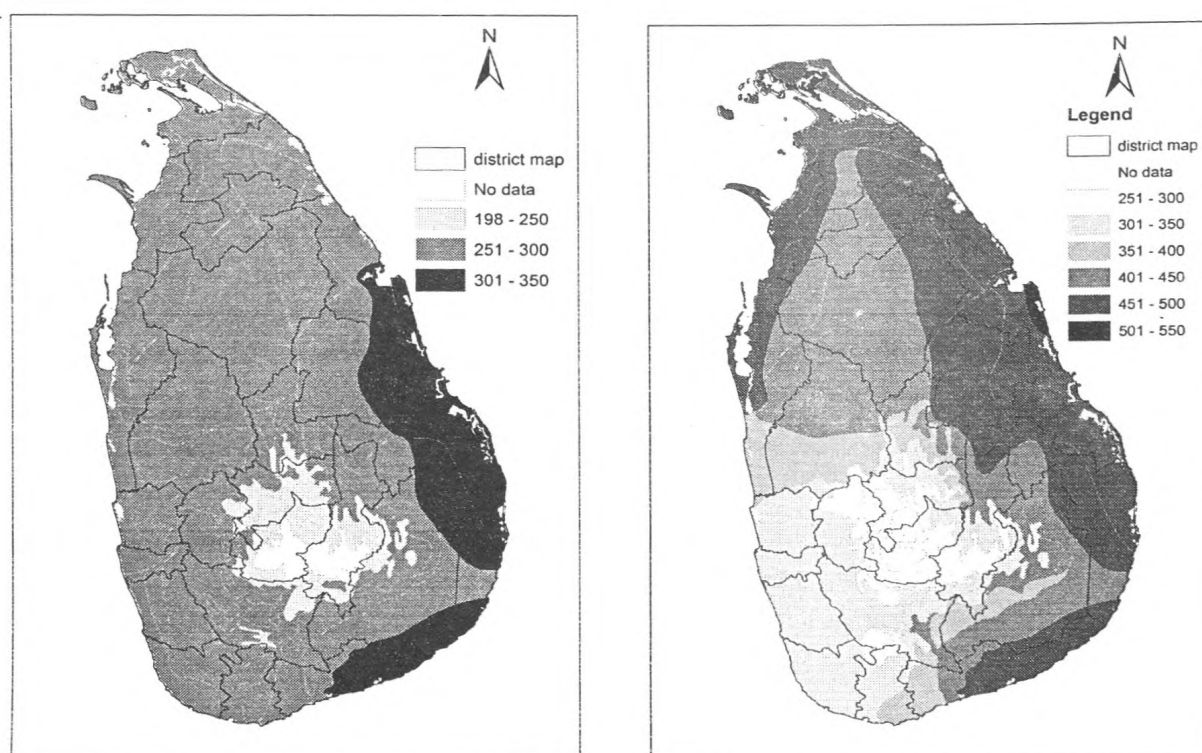


Figure 1. Maps of ETrice in mm during *maha* (left map) season and *yala* seasons (right map).

Values of E_{Trice} were based on weeks of crop establishment for 3 ½ month of rice as follows, 4th week of April for the Wet zone, from 1st week to 3rd week of April for the Intermediate zone and from 1st week of March to 1st week of April for the Dry zone was the best time for crop establishment during *yala* season. In the *maha* season it is from 1st week of September to 2nd week of October for the Wet zone, from 1st week of October to 4th week of October for the Intermediate zone and from 3rd week of October to 4th week of October for the Dry zone.

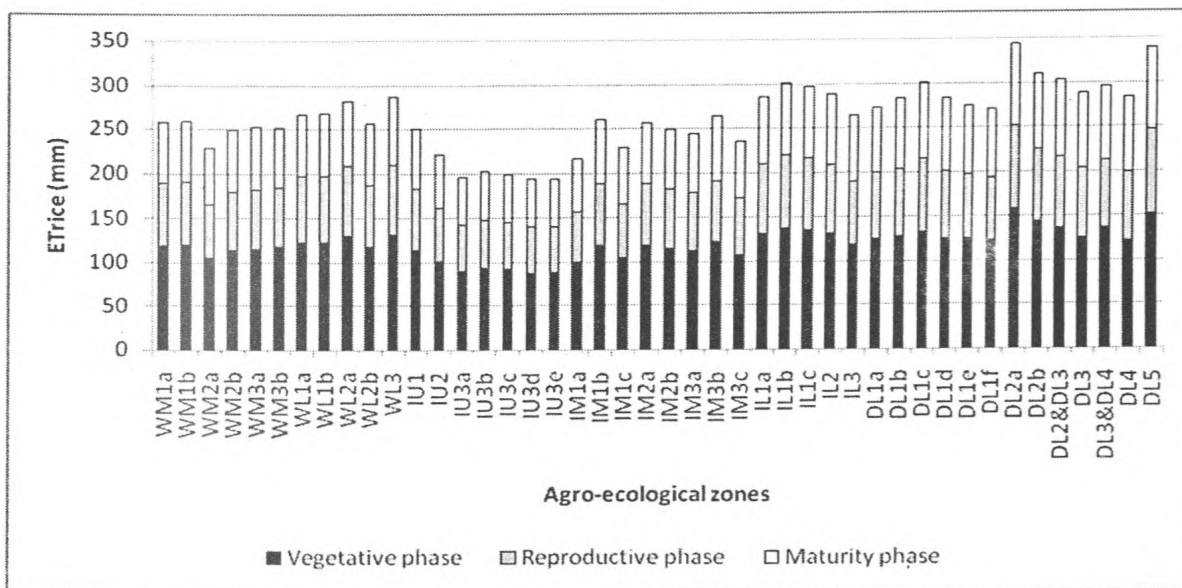


Figure 2. E_{Trice} in vegetative, reproductive and maturity phases of rice in different rice growing agro-ecological zones during *maha* season.

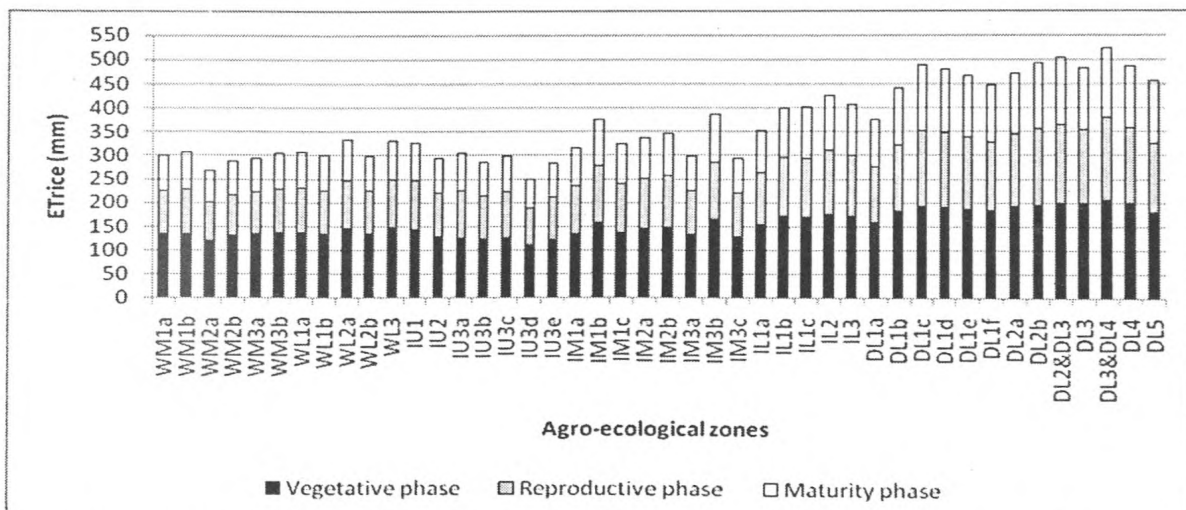


Figure 3. E_{Trice} in vegetative, reproductive and maturity phases of rice in different rice growing agro-ecological zones during *yala* season.

CONCLUSIONS

ETrice of 3 ½ month rice varieties varies from 251 to 522 mm for *yala* season and from 198 to 344 mm for *maha* season. In the *yala* season, DL3 and DL4 agro-ecological zones show the highest ETrice value during the vegetative, reproductive and maturity phases. The lowest ETrice showed in IU3d region. The value of evapotranspiration of rice (ETrice) is an important factor in determining dates of crop establishment of rice.

REFERENCES

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