

Suitability of Pan estimated PET and ET_0 by Modified Penman method to DL_{1b} agro-ecological zone in Sri Lanka

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A reasonable estimate of potential evapotranspiration of a particular agro ecological environment is a prerequisite for efficient management of irrigation water. In Sri Lanka, estimation of crop water requirements and irrigation scheduling are done based on estimates of potential evapotranspiration values based on pan method.

The FAO Penman-Monteith method is recommended as the sole standard method to estimate reference evapotranspiration (ET_0). It is a method with strong likelihood of correctly predicting ET_0 in a wide range of locations and climates. Monthly average maximum temperatures, minimum temperatures, relative humidity, bright sunshine hours and wind velocity values collected during the period of 1976-2004, at Maha Illuppallama meteorological station was used for a study where ET_0 was calculated using the Penman Monteith equation using the Cropwat 4 windows Ver 4.3 software. The Penman Monteith (ET_0) values were compared with potential evapotranspiration (PET) values and modified Penman ET_0 values of above meteorological station to check the suitability of these two methods for DL_{1b}.

The calculated reference evapotranspiration values by all three methods show the similar pattern throughout the year. Three methods have quantitative difference of ET_0 values. However none of the methods showed a significant difference on reference evapotranspiration values under the experiment. The Penman-Monteith approach shows relatively accurate and consistent performance. There is lower estimation of ET_0 values in pan evaporation method because it influenced by pan surrounding, fetch, relative humidity, and wind speed. The modified Penman method shows the higher estimation that uses average recent data for about five years of its calculations. Reference evapotranspiration at Maha Illuppallama exhibits a temporal variability. The lowest ET_0 values occur in December, while the highest ET_0 in March according to three methods.

It is recommended to use Penman-Monteith ET_0 values in any future works such as determining crop water requirement, irrigation scheduling, as input for yield modeling or any other agricultural planning activity.

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N mineralization of soil as affected by different mixtures of vermicompost and coir dust

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A mixture of vermicompost and coir dust sounds better performance than using them alone. The current study assessed the effect of different mixtures of vermicompost and coir dust on soil N mineralization under laboratory conditions.

Different percentages of vermicompost and coir dust were used in making four different mixtures [100 % vermicompost (T₁), 75 % vermicompost: 25 % coir dust (T₂), 50 % vermicompost: 50 % coir dust (T₃), 25 % vermicompost: 75 % coir dust (T₄)] and incorporated to the soil. The control consisted soil without vermicompost or coir dust. NH₄⁺-N and NO₃-N contents were determined at 3, 7, 14, 21, 28, 35, 42, 49, 56, 63 and 70 days after treatment application using standard methods. A Completely Randomized Design (CRD) was used for the experiment with four replicates. Data were statistically analyzed using SAS package.

The variation in soil NH₄⁺-N during the first 3 days of incubation was significantly different ($P \geq 0.05$) in treatment T₁, T₂ and T₃. No distinct relationships were found after day 3 of incubation and NH₄⁺-N contents were highly varied throughout the incubation. However, control (T₅) was found to be significantly differed ($P \geq 0.05$) from other treatments towards the end of the incubation. Furthermore, it was observed that NH₄⁺-N contents were increased at the initial stage of the incubation followed by gradual reductions. Treatment T₂ was found to exhibit the highest NH₄⁺-N contents followed by treatment T₁ and T₃. Despite the highly varied NO₃-N contents observed at the initial stages of the incubation, NO₃-N contents were found to be increased for all the treatments at day 49 onwards. The highest NO₃-N contents were observed in T₁ followed by T₂ and T₃. However, repeated application of had to be done to ensure better performance.

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Effect of dietary rice bran and energy levels on the digesta transit time of broiler chicken

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Gastric transit time (GTT) of digesta through the digestive tract affects the efficiency of feed digestion and absorption. Meanwhile, a range of animal, dietary and environmental factors governs the gastric transit time of digesta. Two completely randomized design experiments, each having seven replicates were conducted to determine the GTT of digesta of broiler chicken as affected by two dietary rice bran (RB) levels (20 and 40%) and two dietary energy levels (3000 and 3400 kcal/kg). All diets were in mash form. Following a five hours of feed deprivation, broilers were offered experimental diets. Birds were observed for the expulsion of the first faecal pellet. The time between feed offer and the appearance of the first faecal pellet was considered as the GTT. Data were analyzed using GLM procedure of SAS. The digesta transit time (mean±SE) of broilers fed 20 and 40% RB were 199±5.30 and 196±4.54 minutes, respectively and was not significantly affected by the dietary RB level. Dietary energy level also did not have significant effect on the mean gastric transit time. The digesta transit time (mean±SE) of the broilers fed 3000 and 3400 kcal/kg were 216±3.78 and 214±6.43 minutes, respectively. Digesta retention time per 100 g of live body weight was also not altered due either to the dietary energy or rice bran levels. Irrespective of the dietary energy level and RB level the retention time ranged within a narrow range from 12 to 14 minutes per 100g of live body weight. There was no significant correlation between the live weight and the mean digesta transit time. It was concluded that dietary rice bran (20 or 40%) and energy levels (3000 or 3400Kcal/kg) had no effect on GTT of broilers.

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