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ABSTRACTS OF ORAL PRESENTATIONS

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2.4.4-2. Dryland wheat yield prediction by precipitation and edaphic data: 2. Artificial neural network models

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Dryland wheat production is highly dependent on climatic factors and therefore its yields show large temporal and locational fluctuations. Since wheat plays an important role in food security in Iran, wheat yield prediction can help the government in decision-making. The objectives of this study were to 1) investigate if artificial neural network (ANN) models can effectively predict Khorasan dryland wheat yield in typical climate conditions and 2) compare the effectiveness of multiple linear regression models with ANN models. Models were developed using historical yield data at multiple locations throughout Khorasan. Field-specific rainfall data including total rainfall through the year (beginning from 1st Oct), total rainfall throughout growing season (total rainfall from 1st Nov to 30th Jun) and monthly rainfall in growing season and also edaphic data such as soil texture, moisture content at field capacity (FC) and permanent wilting point (PWP) and also available water (AW) were used for each location. The results showed that data on monthly rainfall, soil clay percentage, moisture content at FC and PWP are necessary for effective dryland wheat yield predictions. Adjusting ANN parameters such as learning rate and number of hidden nodes affected the accuracy of yield predictions. Optimal learning rates fell between 0.7 to 0.9 and smaller data sets required fewer hidden nodes and lower learning rates in model optimizations. ANN models consistently produced more accurate yield predictions than regression models. ANN dryland wheat yield models resulted in r^2 and RMSEs of 0.8 and 10% versus 0.66 and 29% for linear regression models respectively. Although development of ANN models requires more time compared with linear regression models, the former proved to be more effective for accurately predicting dryland wheat yield under typical Khorasan climate conditions.