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# QUANTIFYING IMPACT OF DROUGHTS ON BARLEY YIELD IN NORTH DAKOTA, USA USING MULTIPLE LINEAR REGRESSION AND ARTIFICIAL NEURAL NETWORK

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**Abstract:** This research investigated the effect of different drought conditions on Barley (*Hordeum vulgare* L.) yield in North Dakota, USA, using Multiple Linear Regression (MLR) and Artificial Neural Network (ANN) methods. Though MLR method is widely used, the ANN method has not been used in the past to investigate the effect of droughts on barley yields to the best of authors' knowledge. It is found from this study that the ANN model performs better than MLR in estimating barley yield. In this paper, the ANN is proposed as a viable alternative method or in combination with MLR to investigate the impact of droughts on crop yields.

Key words: *Barley yield, multiple linear regression, artificial neural network, drought impact*

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## 1. Introduction

Impact of drought on various sectors has long been recognized. Agriculture is one of the major sectors that experiences significant loss during drought events. Agriculture also is the first sector to be affected at the onset of drought because crops at various stages of their growth depend on water and soil moisture [23]. Impact of drought on agriculture has been studied by several investigators [17, 18, 21]. Li et al. [17] studied the drought risk for global crop production under current and future climatic conditions by using historical crop yield and meteorological drought. It is anticipated significant losses in yields of major crops in the future due to drought events. There was \$145 billion loss in crop production across the United States during the last three decades [18]. A better understanding of the

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