

## APPLICATION OF FUZZY LOGIC IN STATISTICS - AN APPROACH IN QUADRATIC REGRESSION MODELS

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- **ABSTRACT:** *With the advancement of fuzzy set theory, many researches have been developed by combining statistical methods with fuzzy logic. In the study of quadratic regression models, there may be interest in obtaining a confidence interval for the critical point. As the critical point estimator involves a quotient of random variables, would be necessary to find the variance estimator for constructing such confidence intervals. Alternatively the construction of conventional confidence intervals, this paper has as a main goal to present different analyzes of the critical point of a quadratic regression model using fuzzy logic. Therefore, were considered data from dry matter production of signal grass at different doses of phosphorus. In the first analysis, by the Zadeh's extension principle, a fuzzy quadratic regression model was found considering uncertainties on estimates of the parameters obtained by the least squares method. Thus, a fuzzy critical point and fuzzy confidence intervals were obtained using interval operations and  $\alpha$ -cuts. A second fuzzy analysis was performed considering the Buckley's methodology, in which a fuzzy estimator to the critical point was constructed based on a conventional confidence interval. Considering the uncertainties treated in the first fuzzy analysis, the increased levels of confidence, based on  $\alpha$ -cuts, resulted in better accuracy of the fuzzy confidence intervals. In the second analysis, the Buckley's methodology provided more information than a conventional point estimate or interval.*
- **KEYWORDS:** *Confidence interval; fuzzy logic; Zadeh's extension principle; fuzzy estimator.*

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