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Research Paper

Yield potential probability maps using the Rasch model

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Yield monitors commonly show that there are very large yield differences within a field which often differ from year to year. Because our ability to estimate reductions in growth and to quantify yield losses resulting from complex interactions and multiple stresses is limited, it does not appear feasible to analyse yield variability using a point to point strategy. For a farmer it is important to select parcels of land, or parts of a parcel, with a high yield probability. To analyse the high yield probability zones the Rasch model is used considering a multi-temporal yield data set. The Rasch measure for multi-temporal yield data makes it possible to place on a continuum axis the yield samples considered in terms of annual yield and vice versa. Using the Rasch measurement one can produce yield potential probabilistic maps taking into account each sample coordinate. From a quantitative point of view it is possible to find yield samples that do not support the model, or which do not reach the expected levels. Positive and negative mismatches can be analysed individually or according to a particular year yield. Thus, the Rasch model makes it possible to systematise the data, making it an effective tool for making appropriate decisions regarding areas with higher yield performance and greater stability over time. Also, it makes it possible to compare the yields of different samples and provide appropriate measures to correct, differentially, samples that obtained different inadequate levels.

1. Introduction

Yield monitors commonly show that there are very large yield differences within a field, and that patterns of yield variability within a field often differ from year to year. This annual difference has led to contemplate that there may be a certain set of production factors that are dynamic in space and time, promoting a high heterogeneity in terms of yield potential of a given parcel of land. For a farmer it is important to select parcels of land, or parts of a parcel, with high yield probability.

At any point in a field, yield is a result of genetics, plant population, management, physical and chemical soil properties, weather and the temporal integration of stresses that the plant population experiences during the season. The first four factors define the yield potential of the population of plants for the particular season, while stresses serve to reduce the defined yield. Yield also results from complex temporal interactions that occur throughout the season and among seasons. Plant response to a stress may be very different depending on the timing of the stress relative to the plant life cycle. In addition, stresses may interact differently depending on the time

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