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Precision agriculture promises to make farming more efficient and should have an important impact on the serious issue of food security, according to a new study published in *Significance*, the magazine of the Royal Statistical Society and the American Statistical Association. In an article about the study in the magazine's May issue, University of Reading Professor Margaret A. Oliver, BSc, PhD, assesses how there is potential to manage land more effectively to improve the farming economy and **crop quality**, and to ensure **food security**.

Spatial variation is at the core of precision agriculture and geostatistics. All aspects of the environment – soil, rocks, weather, vegetation, water, etc. – vary from place to place over the Earth. The soil, landform, drainage, and so on all affect crop growth, and these factors generally vary within agricultural fields. Farmers have always been aware of this situation, but have not been able to measure and map it in a quantitative way.

Measurement is now possible with the tools provided by geostatistics, which describes how properties vary within fields. This information is then used to predict values at places where there is no information for eventual mapping.

Geostatistics can also be used to design sampling of the soil and crops to determine what the soil needs to improve crop growth, in terms of crop nutrients, lime and irrigation, for example. This sample information is used for geostatistical prediction and mapping. Such maps can then be used by farmers for decision-making. Examples include where to apply lime in a field, where more water or drainage is needed, and what amounts of nutrients are required in different parts of a field. Precision agriculture will reduce the amount of fertilizers and pesticides used by applying inputs only where they are needed and in appropriate quantities.

“Precision agriculture will aid efforts to improve food security and also crop quality,”

Professor Oliver notes in the article. “It will also have a major effect on reducing adverse effects on the environment from agriculture.”