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Dynamic Fertilizer Management Triggered by Real-Time Simulations and Weather Conditions.

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Typically, the guiding principle for fertilizer management is a rather fixed cropping calendar in which applications are given at fixed moments in time or at specific crop development stages. The recommendation is based on average weather and crop development. However, in most conditions the average year is rare and more commonly we see that weather conditions deviate and crop development follows different patterns. It is therefore a logical option to adapt management during the growing season according to changing weather conditions and crop development. Different techniques are available to treat fertilization more dynamically including simulation models, decision support systems and real time weather records and forecasts. We present three very different case studies in which these tools have been used. The first case refers to a Costa Rican program on precision agriculture in banana plantations. A network of weather stations provides information to a meteorologist who makes specific weather forecasts for the banana region. A new fertilizer recommendation system is developed that uses the weather conditions and forecasts in combination with yield mapping to establish the proper fertilizer recommendations. A second case refers to an arable farm in the south-west of the Netherlands where actual nitrogen stocks and nitrogen uptake by wheat are simulated for different parts of the field using dynamic real-time simulation modeling. Finally, we simulated nitrogen leaching for various farms in the northern part of the Netherlands. Here, we specifically looked at the environmental impact as a result of specific weather conditions in combination with past and current management. The three case studies illustrate the potential for more dynamic cropping calendars but at the same time show some of the practical operational problems. This includes the need to look into the environmental aspects but also the management goals of the farmer.

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