

EUROPEAN EXPERIENCE WITH VARIABLE RATE FERTILIZER APPLICATION (VRA)

Armin Werner

*Group Manager Precision Agriculture Research,
Lincoln Agritech Ltd, Lincoln, New Zealand
P O Box 133, Lincoln, Canterbury 7640, New Zealand*

Modern fertilization strategies handle the amount of applied fertilizer according to the demands of crops and paddocks. Besides agronomic and economic reasons increasingly also environmental sensitivities (soils, water-bodies, biotopes) have to be respected in fertilization. N-demand and sensitivities are not distributed uniformly over paddocks and within landscapes. The concepts and techniques of precision agriculture (based on sensors, GIS, GNSS) allow addressing these spatially varying requirements in different ways. Outcomes are fertilizer rates that vary over space ('variable rate applications', VRA). Different approaches support VRA for N, P, K, lime and manure.

Estimates vary between 0.1% and 3% of European arable farmers that use some type of VRA (only rare VRA on grassland). Systems can be based on soil maps, soil samples and/or yield maps. Such maps are prepared once within 10 to 25 years (soil assessment, ECa-mapping etc.), only in one of three to seven years (soil analysis) or almost every year (yields). Using these information three to five classes of yield performance or soil nutrient status of the very field are delineated and mapped e.g. as zones. Between these zones mainly P and K, sometimes nitrogen and rarely lime are applied differently with VRA-capable spreaders. Besides this mapping approach about 1.400 to 1.900 sensor-systems are probably used in Europe to apply nitrogen as VRA by optically detecting varying canopy characteristics (greenness, biomass) of cash crops. These sensors can also be used for VRA of fungicides or plant growth regulators. Surveys show that sensor-based nitrogen-VRA result in small (0% to 4%) yield increases, less applied N-fertilizer (-2% to -6%), more uniform product quality (e.g. protein), increased performance of combines (+10% to +25%) and reduced N-leaching (-5% to -20%).

Most VRA show sufficient economic benefit and especially lowered management load of production. Farmers that use VRA are technical innovators or have supportive consultants. Starting VRA often is linked to having implemented satellite based guidance systems and a quest to go beyond. European farms that use VRA often are above average in size and economic performance within their region.

Experiences and results of VRA-fertilization with sensors and mapping systems will be presented.

Editor's Note: An extended manuscript has not yet been submitted for this presentation.