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**Precision systems in agricultural  
and horticultural production**

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# INTRODUCTION

A fundamental concept in precision agriculture (PA), is the collection of data and the development of decision making based on that data. These concepts have been prominent in agriculture and horticulture for many years. This was easier to do without technology however a major constraint was the rationalisation of decision making that individuals took which was often based on experience where the collected data only formed part of the process. This system was adequate as often the farming units were small. However as the size of farms grew, this no longer was efficient. The larger farms required new techniques and tools. These new tools have been developed over time. The Geographic Information System (GIS) was probably the first precision farming tool developed. In the 1960s and 1970s, GIS was used by research institutions, though it was still impractical for most commercial or educational uses. GIS provides the analysis tools needed for precision farming, but few people considered that as a possibility at the time. With the impact of technological developments many new techniques are being introduced into PA which are primarily sensor driven. A major technological development in the last 20 years has been the development of digital hardware which is flexible in implementation whereas its predecessor - analogue hardware was not. Development of realistic spatial scale monitoring and prediction in PA has driven many new developments in land based industries to such an extent that we are in danger of competition between technologies. This can adversely affect commercialisation and uptake with new developments appearing before previous approaches have been fully implemented and scoped.

PA methods promise to increase the quantity and quality of agricultural output while using less input (water, energy, fertilisers, pesticides...). The main aim of PA systems is to save costs, reduce environmental impact and produce more and better food. The methods of PA rely mainly upon a combination of new sensor technologies, satellite navigation and positioning technology, and the "Internet of Things". It has been making its way into farms across Europe and is increasingly assisting farmers in their work.

A wide range of enabling technologies for PA are available. These technologies are used for object identification, geo-referencing, measurement of specific parameters, Global Navigation Satellite Systems (GNSS), connectivity, data storage and analysis, advisory systems, robotics and autonomous navigation. First implementations of PA practices already exist in arable, vegetable and dairy farming, but PA technologies can also be applied to other sectors. Many of these systems can overcome the shortages of labour which can be a major limiting factor on growth of horticultural business in particular. At the moment, there has been rapid progress in PA development, and the PA market is fully embraced by the sector and investors, but the full potential of PA has not yet been harnessed. There is a great need for the data generated by PA systems to be available in the public domain. This could avoid the pit falls of reinventing the application of PA techniques within other areas of agricultural and horticultural production. This potential constraint could be overcome by education. Education for agriculture and food production needs to be re-examined in order to respond to the challenges of rapid technological progress. The need for sustainability in students entering agriculture and horticulture businesses and attending agricultural colleges and universities needs to be considered.

This conference is a follow on from the Remote Sensing conferences held by the AAB in 1990 and 2000. Agriculture and horticulture is facing unprecedented economic environmental and social pressures. The conference will bring together scientists from different disciplines and production systems with an interest and commitment to applying precision technologies.

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