



Soil moisture and NDVI measurement using a sensor in potato fields. Image courtesy of Dr Aitazaz Farooque.

## SMART FARMING: THE PATHWAY TO A SUSTAINABLE AGRICULTURAL FUTURE

The University of Prince Edward Island is currently undertaking a five-year research program to develop and implement precision agriculture technologies in eastern Canada's potato growing regions. Program Leader Dr Aitazaz Farooque spoke to *Potatoes Australia* about the research and the importance of 'smart farming' practices in the potato industry.

Precision agriculture or 'smart farming' is the focus of a five-year research program developed by the University of Prince Edward Island's School of Sustainable Design Engineering.

The university is situated in a leading potato producing province of Canada, providing an opportunity to develop and implement precision agriculture technologies for the sector. The research program, led by the university's Assistant Professor Dr Aitazaz Farooque, aims to improve crop productivity and soil health, reduce agrochemical use by implementing site-specific applications based on soil and crop needs, increase profit margins for growers and ensure environmental sustainability.

### PRECISION IN POTATOES

The research will be conducted at lab and commercial scales of potato fields in Maritime provinces of Canada using different sensors, positioning devices, geographical information systems, control systems, fertigation systems, electromagnetic induction methods, variable rate spreader and yield monitoring.

"We will develop intelligent variable rate technologies for site-specific application of agrochemicals based on soil and crop needs," Dr Farooque explained.

"The potential benefits of intelligent irrigation systems on potato production in eastern Canada will also be explored. Yield monitoring systems, soil and crop sensing, and variable rate seeding will be studied over the next five years to facilitate effective management decisions.

"Additionally, this research program will evaluate the environmental and economic benefits of precision agriculture systems over traditional potato production."

According to Dr Farooque, precision agriculture technologies have great potential to reduce crop growing inputs if they are applied based on soil and crop needs, rather than a uniform approach.

"Application of crop inputs based on need can reduce production cost and increase farm profitability for potato growers. Additionally, these technologies can reduce sub-surface water contaminations, lower surface runoff of nutrients in water bodies and improve air quality.

"Sensor and control systems can differentiate between disease and weed infestations within potato fields for targeted application of pesticides; it can also address irrigation, yield monitoring and environmental aspects of potato production."

Over the next five years, the provincial potato boards in Atlantic

Canada, as well as growers and processors will be involved in this research along with university students, post doctoral fellows and research assistants. There will also be extensive consultation with stakeholders to develop technology that is practical and can be implemented on a commercial scale.

### INTERNATIONAL IMPACT

Dr Farooque said that precision agriculture technologies are evolving with time and continually improving in practicality for different cropping systems.

"These technologies must continue to be extensively tested and evaluated in lab and field environments before they are available for commercial use. From my point of view, farmers need to be involved during the early development stages to make sure growers understand the importance and benefits of precision agriculture systems."

He added that these systems (once developed, tested and extensively evaluated in Canadian growing conditions) could be applied to Australia "with slight modifications".

The research team is still in the early stages of this research, and only have one year's worth of data so far. It would be five to 10 years before these technologies can be used on a commercial scale on-farm.

Despite the lengthy wait, Dr. Farooque recommends Australia undertake a similar program due to its economic and environmental benefits.

"I truly believe that smart farming is the future of agriculture around the globe to achieve sustainability of resources, keeping in view the urbanisation and shrinkage of agricultural land," Dr Farooque said.

"Academia, industry and growers should work collaboratively to develop smart farming strategies to achieve food security in an economically and environmentally sustainable fashion. We also need to collaborate across the borders to come up with applied and innovative solutions for the problems being faced by the agricultural sector.

"In my opinion, precision agriculture is the future of agriculture because of its economic and environmental benefits."