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West Sussex Growers' Association Supported by

Media Partner HorricultureWe







Horticulture 4.0 Conference



The Colin Bloomfield **Memorial Lecture**



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ociation

A NatWest











An Innovate UK funded collaborative feasibility study between:

ecisions







- To feed a growing global population with reducing resources
- Improve sustainability: reduced waste & increase efficiency
- Adopt Precision Farming management methods: 4x Rights





Agricultural problems

Reduced rural labour = ever larger machines Limited time windows = ever larger machines One-upmanship = ever larger machines Lack of resolution for PF **cause** large machines Compaction limiting yield **cause** large machines















A small robotic future

Increased resolution = improved PF = margin gain?

Reduced compaction (tackle cause) = increase yield?

Robots operate in "swarms" = same area covered

Swarm requires management = job retained

Small vehicles are intrinsically safer



1875 ton/ha to 11.27 ton/ha



Over a 150 times reduction in soil movement

Energy implication???







Hands Free Hectare

"Automated machines growing the first arable crop remotely, without operators in the driving seats or agronomists on the ground"

Project objectives

- 1. World first automated field growing cycle
- 2. Challenge perception and inspire through real-time coverage
- 3. Utilising existing machinery and technologies



Precision Decisions



Open

Source





Harper Adams University



Hands Free Hectare – current system



Hands Free Hectare – agronomy









Hands free hectare - video



Hands Free Hectare – field operations



The Times September 6th 2017

- Pre-seed blanket herbicide 6th April
- Plant & Fertilise
- Roll
- Fungicide 1
- Fertilise
- PGR and micro nutrients
- Selective herbicide
- Fungicide T2
- Pre harvest desiccant
- Harvest

25th April 28th April 5th May 25th May 7th June 9th June 3rd July 15th Aug 6th Sept





Hands Free Hectare – result

What to do with 4.5 tons of Barley... BEER?Gin

		Results	Sample	Threshold	% of Threshold
Nitrogen	%w/w	2.27	22700	19000	119
N /S Ratio			15.5	17	91
Phosphorus	%w/w		4074	3500	116
Potassium	%w/w		4811	3800	127
Calcium	%w/w		956	300	319
Magnesium	%w/w		1356	800	170
Sulphur	mg/kg		1463	1100	133
Manganese	mg/kg		14.5	20	73
Copper	mg/kg		4.7	2.5	188
Zinc	mg/kg		28.7	20	144
				No	
Iron	mg/kg		70.7	guidelines	
				No	
Boron	mg/kg		3.7	guidelines	









HFH2 AHDB funding – Remote agronomy









HFH2 AHDB funding – Autonomy improvements







HFH2 AHDB funding – Autonomy improvements





Rolling Team – unload on the move?







HFH2 AHDB funding – Autonomy improvements







Impact – "good" publicity

- Twitter
 - 2,384 Followers Permanent Secretary of Defra
- Facebook
 - 1259 Followers
 - Posts reaching 40,000
- YouTube
 - 316 Subscribers 73,000 Views



Publications across 85+ Countries







Impact – political





tal HandsFreeHectare Retweeted
Kenna Murdoch @KennaEMurdoch · Feb 28
Closing address from HRH The Princess Royal at #TheCityFoodLecture with a mention of @FreeHectare @HarperAdamsUni



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Department for Environment Food & Rural Affairs Health and Harmony: the future for food, farming and the environment in a Green Brexit

Case study: Harper Adams University

The Agricultural Engineering Innovation Centre and the National Centre for Precision Farming at Shropshire's Harper Adams University conduct research and provide support to improve our understanding of precision farming methods.

In September 2017, Harper Adams researchers, working with Yorkshire-based Small Medium Enterprise (SME), Precision Decisions and other industry sponsors, completed a world first. They had successfully grown a crop of barley using only autonomous vehicles and drones and without a human setting foot in the field.

The "Hands Free Hectare" project was a major step in revolutionising how we feed the world whilst helping to protect the environment. To limit damage to the soil for future harvests, and increase efficiency, the team employed a small modified tractor and combine equipped with cameras, sensors and GPS systems. Drones monitored the field, while a robot "scout" collected plant samples for inspection. This research has attracted world-wide interest in UK innovation in agricultural practice, prompting international partners to work with the team and resulting in news coverage in over 80 countries to rate.



Harper Adams University



Impact – Conferences & Awards











THE QUEEN'S ANNIVERSARY PRIZES For Higher and Further Education 2017

FIOIOD & FARMING AWARDS



IAgrE Awards Recognising Excellence









Implication – Cheaper precision farming tech







Implication – A new industry sector



How long to commercialisation?









Implication – Technology requirements... jobs

- Skilled fleet managers
- Agronomists remote sensing
- Programmers
- Agricultural Roboticists



• Communication infrastructure development





Implication – small team & budget innovation

- Collaboration
- "Skunkworks" model SMEs & Corporates
- Utilising technologies from other industry
- "Youthquake" for industry developments













New projects – CAV3 Fund

On Highway / Off Highway Communications and safety system Analysis "Drive to field"

HFH teaming up with:



Considering:

- Autonomy to SAE4
- V2I and V2V communication
- SAFTEY



<u>Final Testing Task</u> 1 Leave machinery store 2 Negotiate farm yard 3 Navigate along farm track 4 Navigation along road 5 Enter field





Field

Future projects – Hands Free Farm

A fully autonomous cereal farm working with multiple crops and fields "Swarms" of precision machines, autonomous farm yard and remote agronomy



For future updates and developments



@freehectare









www.handsfreehectare.com



worms.drones.hours









