LOS DRONES EN LA AGRICULTURA:
DE LA AGRICULTURA DE PRECISIÓN A LA APLICACIÓN DE FITOSANITARIOS

ÍNDICE

- Introducción
- PROYDRON: La fumigación con medios aéreos convencionales
- DRONE HOPPER: Drones de alta capacidad de carga para tareas agrícolas
- AGRO DRONE: Drones and Precision Agriculture

PROYDRON

LA FUMIGACIÓN CON MEDIOS AÉREOS CONVENCIONALES

ÍNDICE

1. USUARIOS DE LA FUMIGACIÓN AGRÍCOLA

1.1. TIPOS DE EXPLOTACIONES

a) Pequeñas de 0 a 10 ha.

b) Medianas de 10 a 100 ha.

c) Grandes más de 100 ha.

1.2. TIPOS DE TRATAMIENTOS

a) Fungicidas.

b) Herbicidas.

c) Abonos.

d) Insecticidas.

e) Plaguicidas.

1. USUARIOS DE LA FUMIGACIÓN AGRÍCOLA

1.3. NORMATIVA EUROPEA E INGENIERÍA

1.4. PROBLEMÁTICA EN PEQUEÑAS Y MEDIANAS EXPLOTACIONES.

a) Costo de desplazamiento de aeronave.
b) Costo humano.
c) Imposibilidad de medio aéreo por irregularidad y tamaño.

1. USUARIOS DE LA FUMIGACIÓN AGRÍCOLA

1.5. PROBLEMÁTICA DE CULTIVOS EN ACEQUIAS (ARROZ).

a) Solo posible con medios aéreos.

b) Pequeños arrozales (cobertura).

c) Pistas de aterrizaje (arrozales).

1.6. COOPERATIVAS AGRARIAS.

2. MÉTODOS ACTUALES DE FUMIGACIÓN

2.1. MEDIOS AÉREOS (AVIÓN Y HELICÓPTERO).

a) Costos por ha, por desplazamiento (ferry).

b) En caso de avión, localización de pista de despegue y aterrizaje o planificación de la misma.

c) Helicóptero (costo hora de vuelo, 10 veces superior)

d) Inaccesibles por costo y repercusión por ha para pequeñas y medianas explotaciones.

2. MÉTODOS ACTUALES DE FUMIGACIÓN

2.2. MEDIOS TERRESTRES (PEQUEÑAS Y MEDIANAS EXPLOTACIONES).

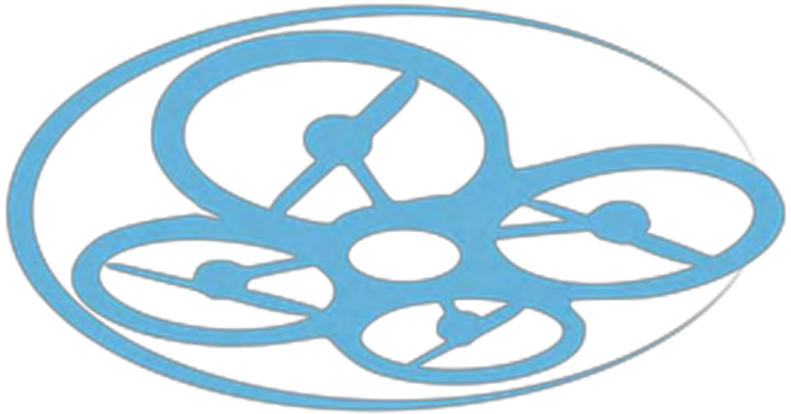
a) Tractor (lento y trabajoso)

b) Manual (lento, trabajoso y costoso)

c) Utilizado por no poder acceder a aéreo.

3. FUTURO DE LA FUMIGACIÓN AGRÍCOLA

PROYDRON



DRONEHOPPER

DRONE HOPPER:
Drones de alta capacidad de carga para tareas agrícolas

DRONEHOPPER
FIREFIGHTING DRONE

DRONE HOPPER

- Start-up creada en Septiembre de 2015
- Diseño y Fabricación de Drones Autoguiados de Alta Capacidad de Carga
- Aplicación Original ➔ Incendios Forestales
- Aplicaciones Actuales:
  - Agricultura
  - Incendios Urbanos
  - Incendios Forestales

DRONEHOPPER
FIREFIGHTING DRONE

PROBLEMAS

- Contaminación
- Impacto en las personas
- Coste
- Condiciones de operación limitadas

TECNOLOGÍA – AGUA NEBULIZADA

- Utiliza flujo de los motores para crear diferencia de presión
- No necesita grupo de presión
- Dirige un chorro de aire húmedo hacia el suelo

SOLUCIÓN - DRONE HOPPER

- Alta Capacidad de Carga (40 – 60 – 80 litros)
- Preciso – Menos producto – menos contaminación
- Eficiente (100 -150 Has por día por unidad)
- Flexible (sistema de descarga modular)
- Económico
- Escalable
- Automatizable
- Disponible día y noche
- Posibilidad de gestión adicional de datos

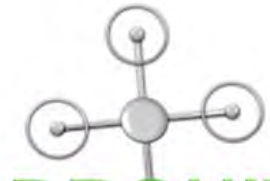
DRONEHOPPER
FIRE FIGHTING DRONE

SOLUTION - DRONE HOPPER

Universidad
Carlos III de Madrid

AXTER
AEROSPACE

GRODRONE



DRONITEC
TECNOLOGÍA Y SERVICIOS CON DRONES

INTECH DMLS PVT LTD
Sinteneering Innovations

PROYDRON

AUTOMATED DEVICES

SCHÜBELER
jets

MicroPilot

RMIT
UNIVERSITY

DRONEHOPPER
FIRE FIGHTING DRONE

FIRST PROTOTYPE

- 5 litres capacity
- Hexacopter - Propellers
- Built mainly on High-end RC COTS components
- Carbon fiber customization on water tank (anti-dynamic design to avoid liquid rapid movement)
- Customized release system
- Detachable fairing
- Good results on tank design (stability) and on release system
- Expected stability impact with outer fairing only.

DH_001

DRONEHOPPER
FIRE FIGHTING DRONE

SECOND PROTOTYPE

- 300 litres capacity
- Hexacopter – 36 EDF
- Completely new design
- Inherited water tank anti-dynamic from previous unit
- Customized release system
- Double-fix protection fairing
- Provisions to evolve to thermal engines within available space

DH_002

DRONEHOPPER
FIREFIGHTING DRONE

THIRD PROTOTYPE

- 80 litres capacity
- Optocopter - Propellers
- Built on customized parts and available light aviation components
- Fiber Glass water tank (anti-dynamic design)
- Customized modular release system
- Flight Test Q3 2017

DH_003

DRONEHOPPER
FIREFIGHTING DRONE

AGRO HOPPER – 60 litres

FOREST HOPPER– 120 litres

URBAN HOPPER– 150 litres

WILD HOPPER– 300 litres

HORIZON 2020

CDTI Centro para el Desarrollo Tecnológico Industrial

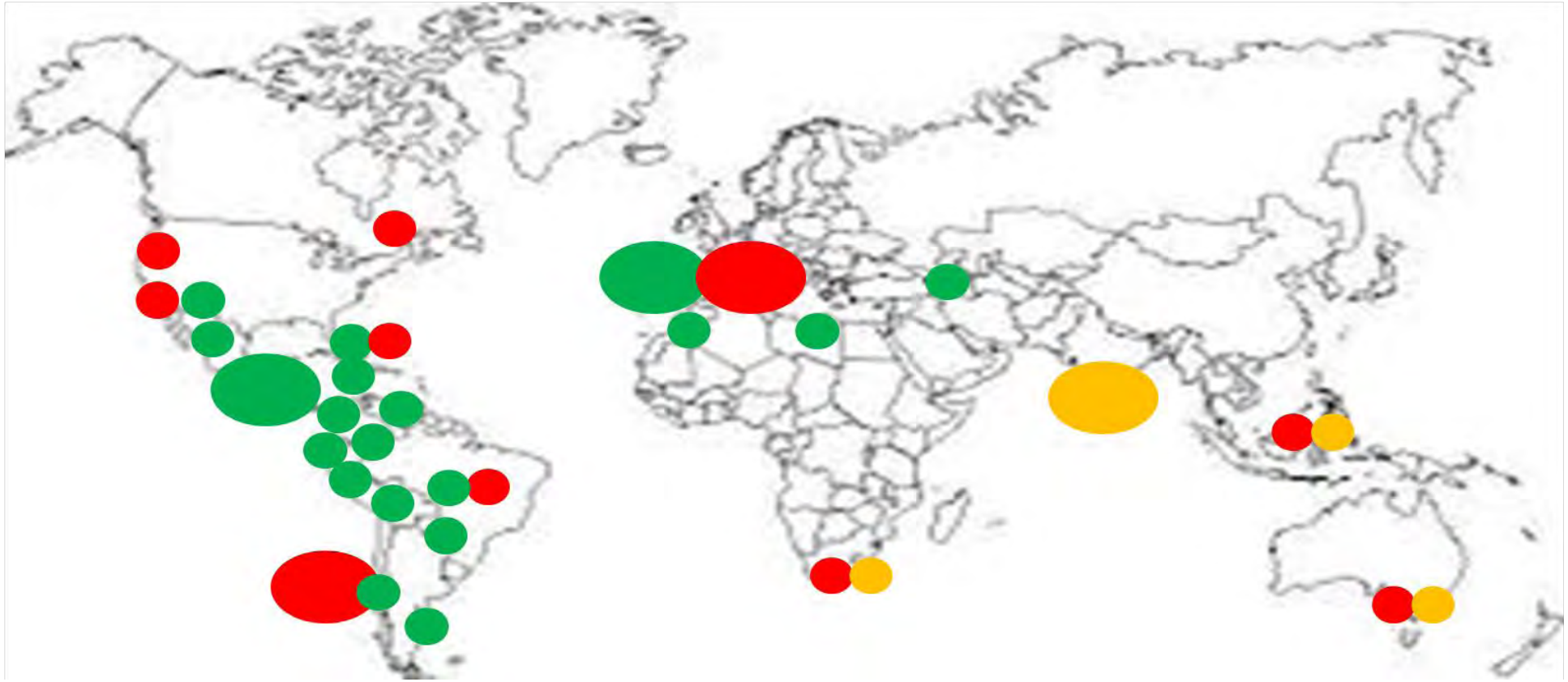
TEAM

CONTACTS – PARTNERS - WORLDWIDE

AGRO HOPPER

URBAN HOPPER

FOREST/WILD HOPPER



THANK YOU!

Pablo Flores Peña

CEO DRONE HOPPER

+34 620 55 02 31

pablo.flores@drone-hopper.com

FINANCIADA POR ENISA

MINISTERIO DE INDUSTRIA, ENERGIA Y TURISMO

European Commission

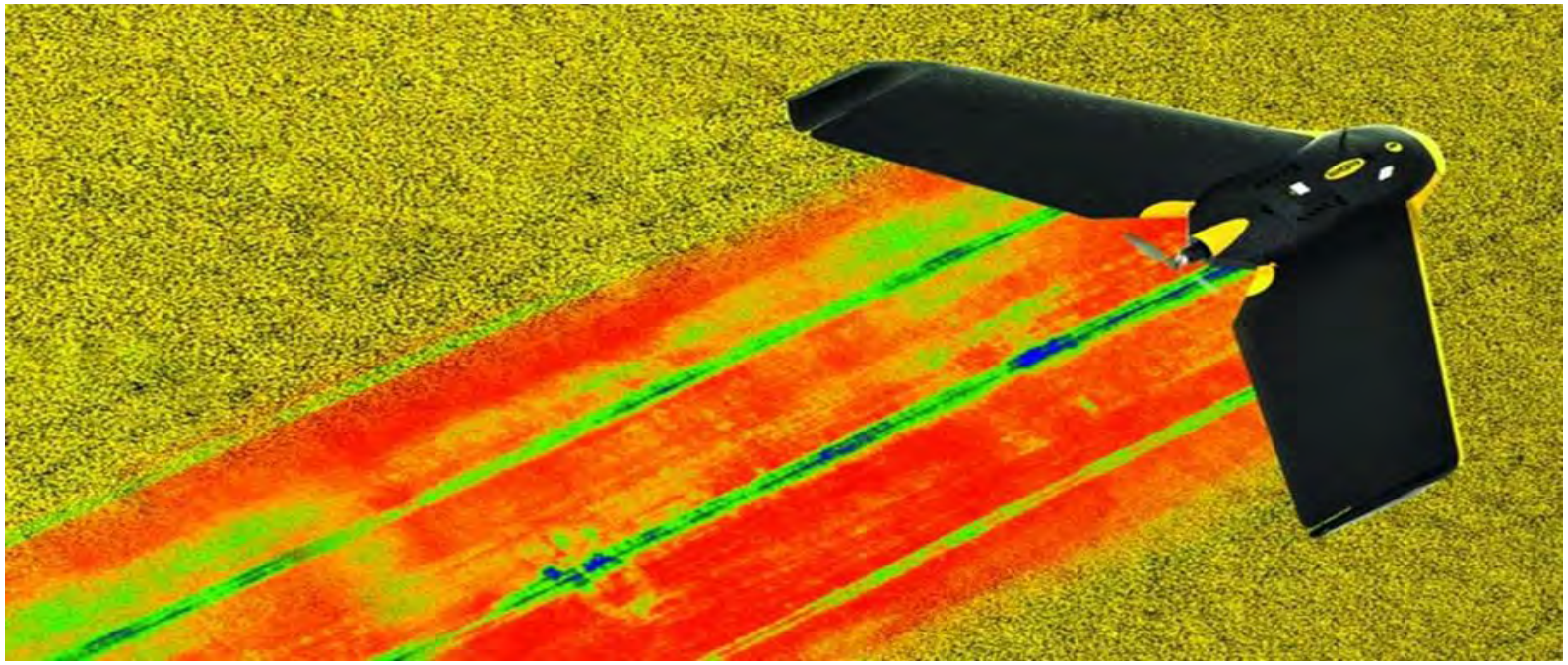
Horizon 2020
European Union funding
for Research & Innovation

esa business incubation centre Madrid Region

fundación para el conocimiento madrid

Comunidad de Madrid

AGRODRONE



DRONES AND PRECISION AGRICULTURE

Why Precision Agriculture?

Equilibrium is the basis for quality agronomy!

Quality Agronomy results in high quality products with less environmental damages from pesticides and chemical fertilizers;

Quality Agronomy results in capacity to enter high value markets that demand quality for food products;

To achive quality, one must know:

- What is in the soil;
- The soil balance crops need!

The tool for those 2 objectives is Precision Agriculture

AGRODRONE

How Agrodrone does it?

With sensor technology; drone technology and high performance soil and plant analysis!

But first:

Why this presentation of Agrodrone in Spain?

Because we believe Spain desires to enter and win European Organic Market
with high quality food products!

The only way to enter and win!

AGRODRONE

And how about environment?

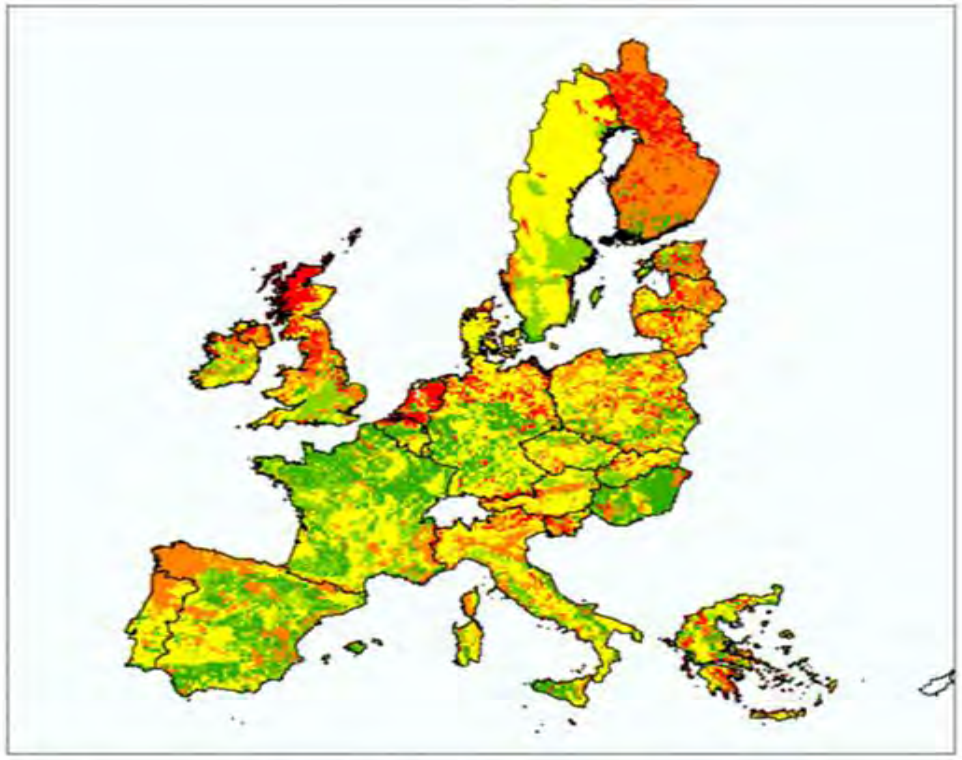
To enter and win the European Organic Market, Spain must reduce its dependency on chemical fertilizers and pesticides!

Spain has been growing in organic farming at a more intense rate than Portugal but the 2 countries are very similar in respect to fertilizer use, way far from intense agriculture like the Netherlands.

In regarding to Spain and the efficiency of fertilizer use, Agrodrone in association with Drone-Hopper, propose a organic strategy for uprising in organic but also conventional fertilizer use eficiency

AGRODRONE

This map:



Red colour corresponds to class 1, very weak P retention capacities.
Dark green corresponds to class 5, very strong retention capacities.
Transitional colours correspond to transitional classes.

Shows that P retention in Spain and France is very high (the green areas).

AGRODRONE

The green areas have intensive agriculture but high P retention?

This can be good in respect to not polute water lines with Phosphorus but a closer look tells a different story!

If soils are unbalanced, several factors contribute for lock-up of nutrients;

The aplied P is getting locked and not being delivered to crops;

It also means extra costs for farmers, because:

They buy fertilizers that are not being used efficently;

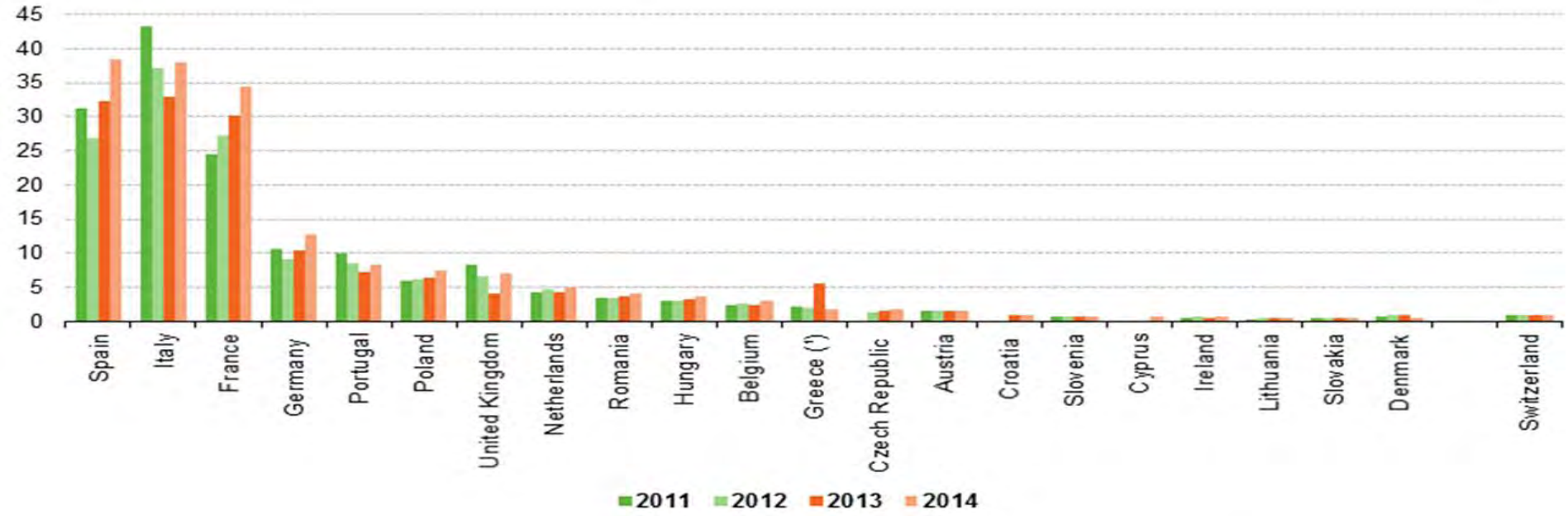
and

This lack of efficiency in fertilization results in high pest and disease in cultures!

AGRODRONE

This graph shows what I'm stating:

Graph for Pesticide use in Europe



Note: Sales under 0.5 thousand tonnes in Bulgaria, Estonia, Malta, Latvia, Luxembourg, Finland, Sweden and Norway.
(*) Break in the series in 2013.

The graphs for fungicides, insecticides and herbicides put Spanish agriculture in poor efficiency classification…there is here a great need for intervention or any organic strategy will be compromised and for sure the viewing of this statistics makes me suspicious about Spanish organic certification.

AGRODRONE

If Spain wants to win the EU Organic Market…

it must elevate the agronomic efficiency of the way crops are being produced or the quality of products will cannot win this kind of market

Consumers are evolving in the attention they put into the food they are buying!

They look for:

Organic certified products;

Quality of the products;

But also environmental footprint of products

And social aspects of food production

Etc…!

AGRODRONE

there is here a great need for intervention or any organic strategy will be compromised

Good marketing must be based on good quality or its future is compromised

If Spain wants to improve crop quality must also attain agronomic efficiency about soil fertility and the cooperation between Agrodrone and Drone-Hopper, can help to elevate soil fertilization and related fertilizer use efficiency with:

reduction of pesticide usage and farmers economic results improvement!

AGRODRONE

How we do it?

Drone-Hopper technology is very efficient for spraying fertilizers and pesticides in big areas.

Because the drones obey to a flight plan, it is possible to do the diferential delivery of fertilizers accordingly the fertility map of the crop area.

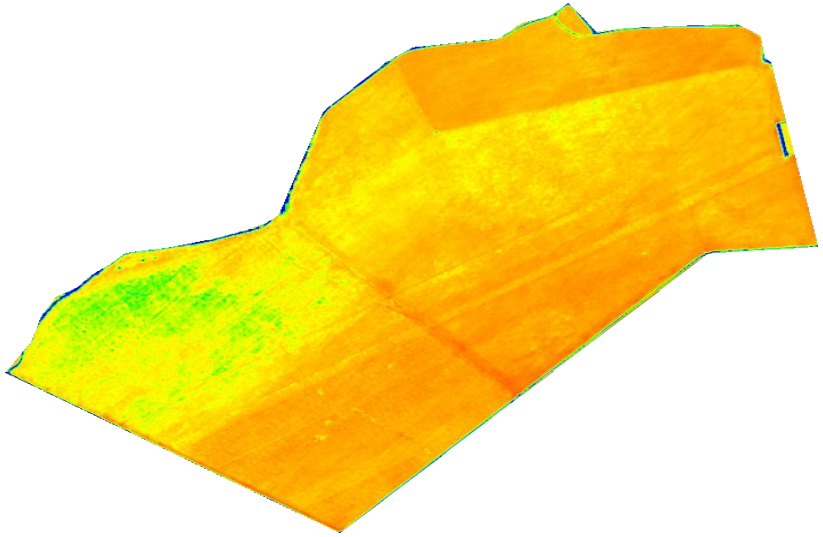
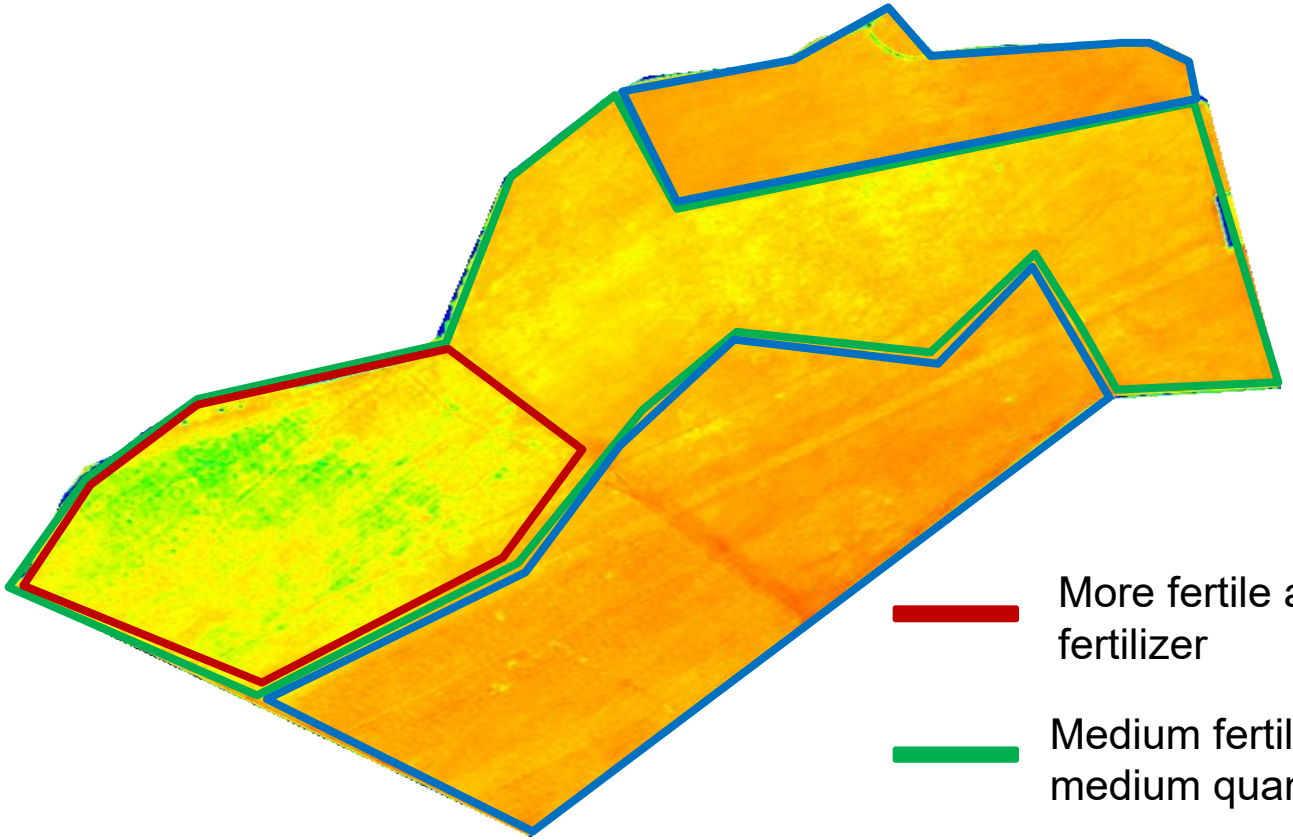


Image of crop area processed with NDVI, showing different development by vegetation

AGRODRONE

Thanks to Drone-Hopper technology it is now easy to spray fertilizers very efficiently and accordingly to fertility classification of crop fields.



More fertile area where Drone-Hopper will spray less fertilizer

Medium fertile area where Drone-Hopper will spray medium quantity fertilizer

Less fertile area where Drone-Hopper will spray more fertilizer

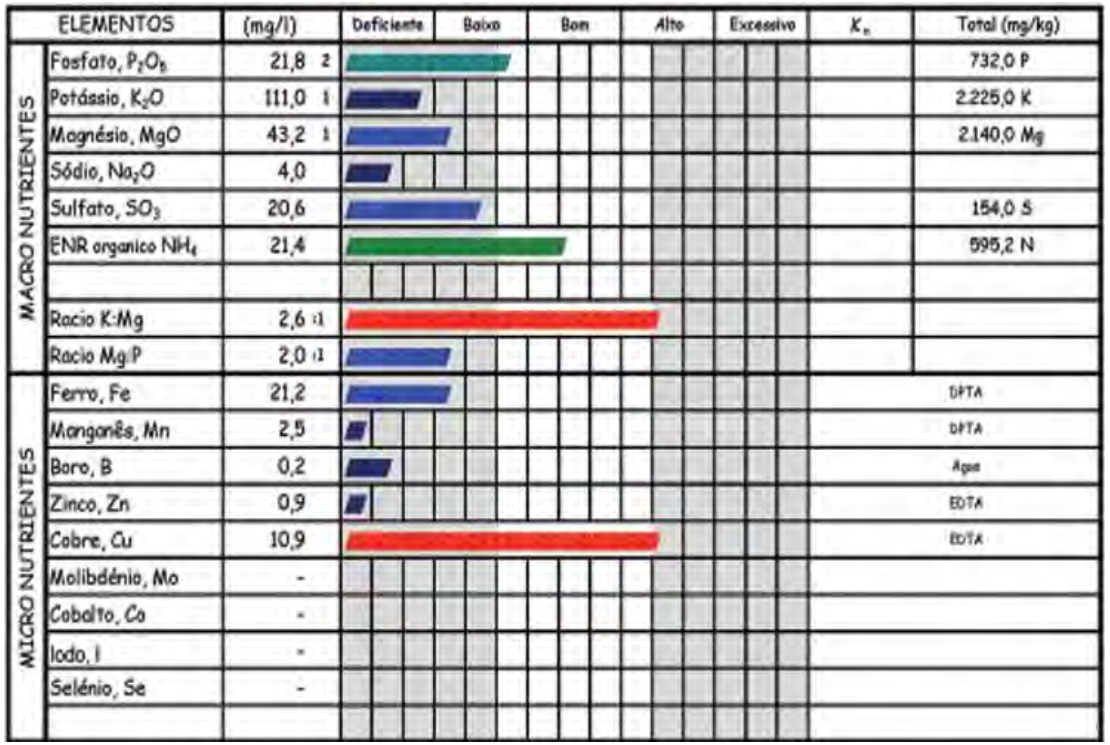
The same procedure is valid for pesticide spraying.

AGRODRONE

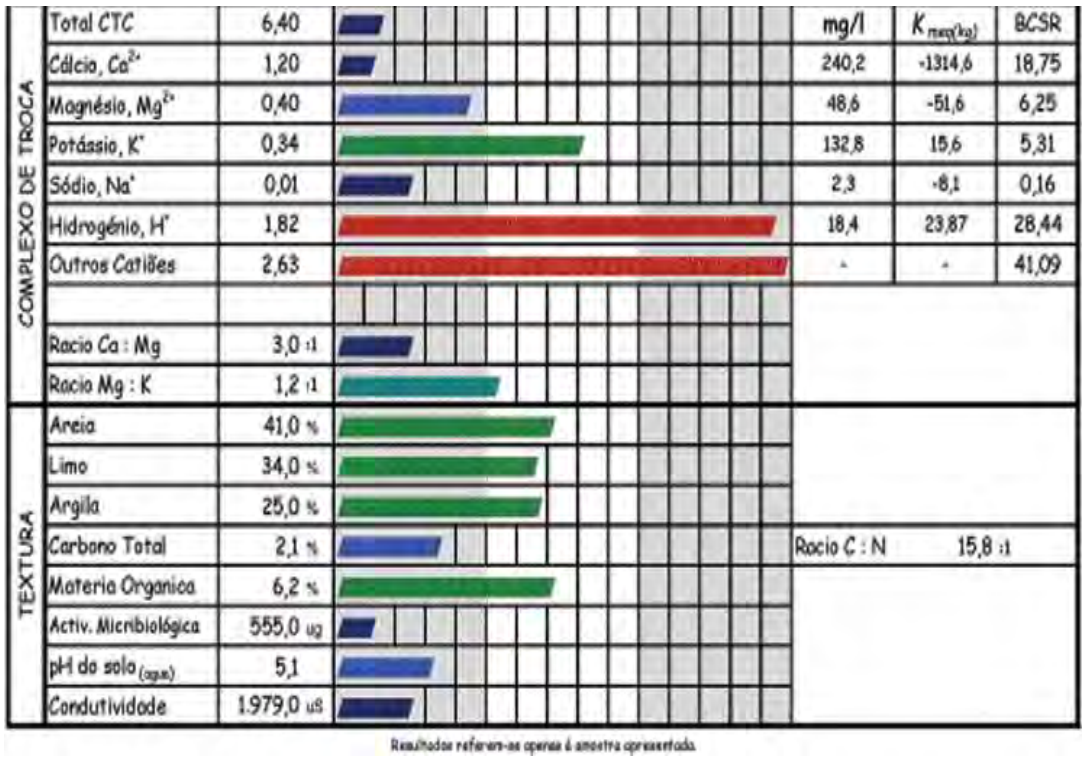
▲GRODRONE

Presents the capacity to go beyond precision agriculture technical output of major companies in the market!

Recent development of sensor technology for crop monitoring allowed efficient parameter evaluation on plant health



	ELEMENTOS	(mg/l)	Deficiente	Baixo	Bom	Alto	Excessivo	K_x	Total (mg/kg)
MACRO NUTRIENTES	Fosfato, P_2O_5	21,8 :2							732,0 P
	Potássio, K_2O	111,0 :1							2.225,0 K
	Magnésio, MgO	43,2 :1							2.140,0 Mg
	Sódio, Na_2O	4,0							
	Sulfato, SO_3	20,6							154,0 S
	ENR organico NH_4	21,4							595,2 N
	Racio K:Mg	2,6 :1							
	Racio Mg:P	2,0 :1							
MICRO NUTRIENTES	Ferro, Fe	21,2							DPTA
	Manganês, Mn	2,5							DPTA
	Boro, B	0,2							Agua
	Zinco, Zn	0,9							EDTA
	Cobre, Cu	10,9							EDTA
	Molibdénio, Mo	-							
	Cobalto, Co	-							
	Iodo, I	-							
	Selénio, Se	-							



			mg/l	$K_{max(kg)}$	BCSR
COMPLEXO DE TROCA	Total CTC	6,40			
	Cálcio, Ca^{2+}	1,20	240,2	-1314,6	18,75
	Magnésio, Mg^{2+}	0,40	48,6	-51,6	6,25
	Potássio, K^+	0,34	132,8	15,6	5,31
	Sódio, Na^+	0,01	2,3	-8,1	0,16
	Hidrogénio, H^+	1,82	18,4	23,87	28,44
	Outros Catiões	2,63	-	-	41,09
	Racio Ca : Mg	3,0 :1			
	Racio Mg : K	1,2 :1			
TEXTURA	Areia	41,0 %			
	Limo	34,0 %			
	Argila	25,0 %			
	Carbono Total	2,1 %	Racio C : N	15,8 :1	
	Materia Organica	6,2 %			
	Activ. Microbiológica	555,0 ug			
	pH do solo (agua)	5,1			
	Condutividade	1.979,0 uS			

Resultados referem-se apenas à amostra apresentada.

Do exist a lot of companies in the precision agriculture market like Agrodrone, that can do it in great detail!

But crop monitoring in farm fields only allows knowledge about relative plant health!

Compares more healthy plants against the less healthy ones, against a colour pattern.

Doesn’t show directions for solving crop health problems!

Another precision agriculture parameters like the ones given by several specific tools, are often read with lack of knowledge about the true agronomic meaning.

Soil testing is one exemple of that!

AGRODRONE

Business Market that puts our company aside competition:

We go beyond crop monitoring

We identify crop problems in great and wider detail

We provide the best agronomic solutions to correct detected problems

Our solutions are environmental sensitive

Our solutions are cost effective

Our solution provide better crop yield and crop quality

Like for example, given simple solutions to release all this phosphourus shown in green at the first picture in this presentation:

Red colour corresponds to class 1, very weak P retention capacities.
Dark green corresponds to class 5, very strong retention capacities.
Transitional colours correspond to transitional classes.

And release it to crops,

With great economic advantage for farmers,

And also for the environment!!!

AGRODRONE

Can deliver with Drone-Hopper, new inputs, more affordable for farmers in many ways:

Cheaper fertilizer solutions;

Solutions that don’t compromisse fertility (like the Phosphorus problem);

Solutions that give crops advantage in relations to weed development, reducing the need for herbicides (Spain is major consumer of Roundup)

Solutions in pest/disease management, for any attacks crops may face, but valid in organic farming certification.

Because soils are saturated with problems, the best solution is aerial spraying for this new solutions that run also by microbial technologies.

With Drone-Hopper and Agrodrone colaboration agriculture in large areas and forestry, can see valid development of the best solutions.

Both for farmer results, consumer health and environment!

It is a WIN-WIN-All-OVER situation, necessary for the new vision about economy-environment-society, that this new technologies brought to the way man produces natural food!

With this project growing in Spain, for sure any organic strategy will find valid support...

...and any convencional farming will see reduction of costs with better yields and results.

AGRODRONE

Muchas Gracias!!