INTELLECTUAL OUTPUT 04

Equipment, Uses of UAVs in Precision Agriculture and Logistics of UAVs

Date: 06.2022

Project Title: Smart Agriculture Training and Implementation

Project Code: 2020-1-EL01-KA226-VET-094682

Project Acronym: SATI

SATI
Smart Agriculture Training & Implementation

Co-funded by the Erasmus+ Programme of the European Union

ΙΔΡΥΜΑ ΚΡΑΤΙΚΩΝ ΥΠΟΤΡΟΦΙΩΝ
ΙΚΥ

Preface

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Intellectual Output Description

Precision agriculture has experienced a new industrial revolution comparable to the invention of the wheel or the tractor, hand in hand with new technologies, improvements are born every day, more progress is made and progress is made towards a new world hand in hand with all kinds of advances such as new species of plants resistant to diseases, optimization of the irrigation system and transport of materials and supplies throughout the country, managing to provide more quality to the final customer, as well as variety and prices more adjusted to the shopping basket of the consumer citizen .

One of the great advances comes from the technological world, born as a hobby of model aircraft enthusiasts and large companies that have grown later and have invested in a project that moves billions a year in products, peripherals and components.

Drone technology (also known as Uav, or Uas) has brought about a substantial change in the way of seeing and understanding precision agriculture, since its use has branched out and specialized to unsuspected limits, creating products to meet specific needs in a primary sector that was already demanding a new revolution. Because it was necessary. And because it came to stay.

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Languages: English, Greek, Spanish, Turkish
Output type: Course / curriculum – Pilot course / module
Start Date: (dd-mm-yyyy) 01-03-2021
End Date: (dd-mm-yyyy) 30-06-2022
Version: 1.2

3 Colophon

The content in this course is based on several resources:

- Learning materials as developed by pilotos profesionales, expertos academicos y personal cualificado
- Training material developed from scratch for the scope of this project
- Research material produced from sus respectivos autores
- References described in the "Further Studying" section of this course

Materials were prepared as book and E-Learning Platform distance learning Material. Please contact us (upa@upa.es) if your name has been inadvertently be omitted.

4 Methodology

The Output type is Course / curriculum – Pilot course / module. Data will be collected for each participating country from official sources and recent cases will be presented.
Copartners will contribute equally to the output.

It has been possible to carry out this project thanks to the team made up of expert staff in precision agriculture from UPA with the advice of professional drone pilots, agronomists, local and international service providers and real farmers who work with the product on a daily basis and They have been great allies when it comes to being able to offer real expectations to the project.

Introduction

1. Introduction to equipment

1 Unmanned aerial vehicles, drones

One of the new technologies that stands out today and captures everyone's attention are the so-called drones or unmanned aerial vehicles (UAV).

A UAV is defined as an unmanned aerial vehicle, reusable, capable of maintaining a controlled and sustained flight level by remote control and propelled by an internal combustion engine or of reaction. In the past, UAVs were only remotely piloted aircraft, but today, with the advancement of technology, different types of drones can be distinguished; those that continue to be managed remotely from a location and those that fly autonomously using the base of pre-programmed flight plans by GPS, thanks to the fact that they have a complex system that allows their automation.

However, a remotely piloted aircraft is technically considered a drone when it is in commercial or professional use. When the use of these aircraft has
exclusively for sports or recreation purposes are considered "model aircraft" and are governed by their regulations.
It is also necessary to differentiate drones for civil use, which today are already certified, with those for military use, these are called unmanned combat air vehicles (UCAV, unmanned combat air vehicle)
Finally, it must be emphasized that drones are aircraft and as such are subject to world aviation legislation. It is also necessary to differentiate drones for civil use, which are already certified today, with those for military use, these are called aerial vehicles. unmanned combat air vehicle (UCAV)
Finally, it should be emphasized that drones are aircraft and as such are subject to global aviation legislation.

1.2 Beginnings

In 1917, a General Motors engineer named Charles Kettering designed the first prototype drone, which had to be programmed through a clockwork mechanism to start flying and land on enemies like a bomb, so it had to be named Kate. Aviation Torpedo. A few years later, with more advanced technology, in 1940, the Soviet Union built a torpedo-armed drone. The first mass-produced UAV, the Radioplane OQ-2, was born in the United States, this aircraft was used as a target for training pilots and gunners. At the end of World War II, drone funding took a backseat, overshadowed by the development of nuclear or ballistic missiles. According to Morante (2014), the greatest advance in the creation of drones occurred in Germany, but once it was defeated during the Second World War, most of the knowledge and studies ended up in US offices, from where they continued to work on their evolution.

1.3 News

Today, UAVs have ceased to be a purely military technology and have begun to be used in civilian environments. One area where they have been used is in archaeology, where they help in the search and study of archaeological remains in inaccessible areas, as they can provide important data when taking pictures of large areas. Drones are also making inroads into agriculture, where they are being tested to monitor large areas of crops for early detection of potential problems, including irrigation and disease that could affect TIF: "Technology for Drone Farmland Monitoring plants and therefore a more precise control of the plantation to maximize yields. Drones are also beginning to be experimented with in meteorology, with the aim of preventing the risk of natural disasters, receiving information on atmospheric conditions or measuring the levels of pollution in the air. One of the main areas where drone technology is expected to be implemented is surveillance and security. Brazil is one of the countries concerned, so it has a plan to control parts of its borders with the help of drones. Another country where their use is considered viable is England, where the police want to implement them in the fight against crime and the monitoring of massive public events.

The versatility offered by drones means that they are used in tasks where humans cannot access or do not want to because they are highly risky for health. One of them is the exploration and cleaning of toxic waste, as well as being useful for the control of forest fires and construction.
Recently, simpler models designed with the purpose of responding to the civilian market, who would use these devices in the form of recreation and in their free time, in activities such as photography, video and augmented reality games, have been introduced on the market.

In the field of video and photography, the use that is being given to unmanned aerial vehicles is to mount cameras and take aerial photographs of weddings, as well as in other social events such as soccer matches, Olympics, among other events. , where they can be used for the televising of the game and also for the control and identification of problems among the spectators.

A project that seeks an improvement in taking pictures with the use of drones is carried out by researchers from the Massachusetts Institute of Technology (MIT) and Cornell University, where they designed small flying robots equipped with lamps that position themselves automatically according to the effect you want to give the photo. In this way it would help photographers with lighting problems, a really important issue, since drones would solve it precisely.

In this same area, these devices have also begun to be used to make documentaries, because thanks to them it is possible to access wild animals from a closer distance and thus be able to photograph and film them in their natural environment. An example of this was a documentary made by "Dolphin and Whale Safari" from Dana Point on the coast of California, USA, where thanks to the use

of a drone they managed to record a stampede of dolphins and the behavior of the whales teaching them to swim. to their young.

As time progresses, new functions are found for unmanned aircraft. One of the most innovative plans was launched by Amazon in 2013, where the company's CEO declared the manufacturing of the "Prime Air" program, which will use drones as couriers to deliver packages weighing less than two kilos.

Another company that plans to use drones for package delivery is Google, with its Wings Project, which stated that it began the program to create these devices in 2012, but has kept it secret. Google wants to use these drones to deliver packages in isolated areas that need help or have had a catastrophe and are difficult to access by conventional means TIF: "Use of drone technology to control agricultural fields"

1.4 Issues and regulations

In our country, the manufacture and use of drones do not have any law to be regulated. For this reason, today the control and fate of these unmanned aerial vehicles is a matter of discussion.

One of the main criticisms of those who maintain a negative opinion of the use of these artifacts is to see the possibilities that they may be used illicitly to invade people's privacy, or to be used for terrorist purposes. Examples that reference this criticism can be seen in countries like Israel, where they used drones to bomb the Gaza Strip in 2012.

Defense Minister Agustin Rossi gave a statement in the newspaper La Nación where he said: “It is important to open a debate on the use of this type of technology. But we must also be clear that we cannot allow the imposition of a discourse of some developed countries to end up playing against the national projects of each country”. With this phrase, the minister sought to defend the decision presented by the government and INVAP to develop sophisticated drones within the national territory. TIF: “Use of drone technology to control agricultural fields”

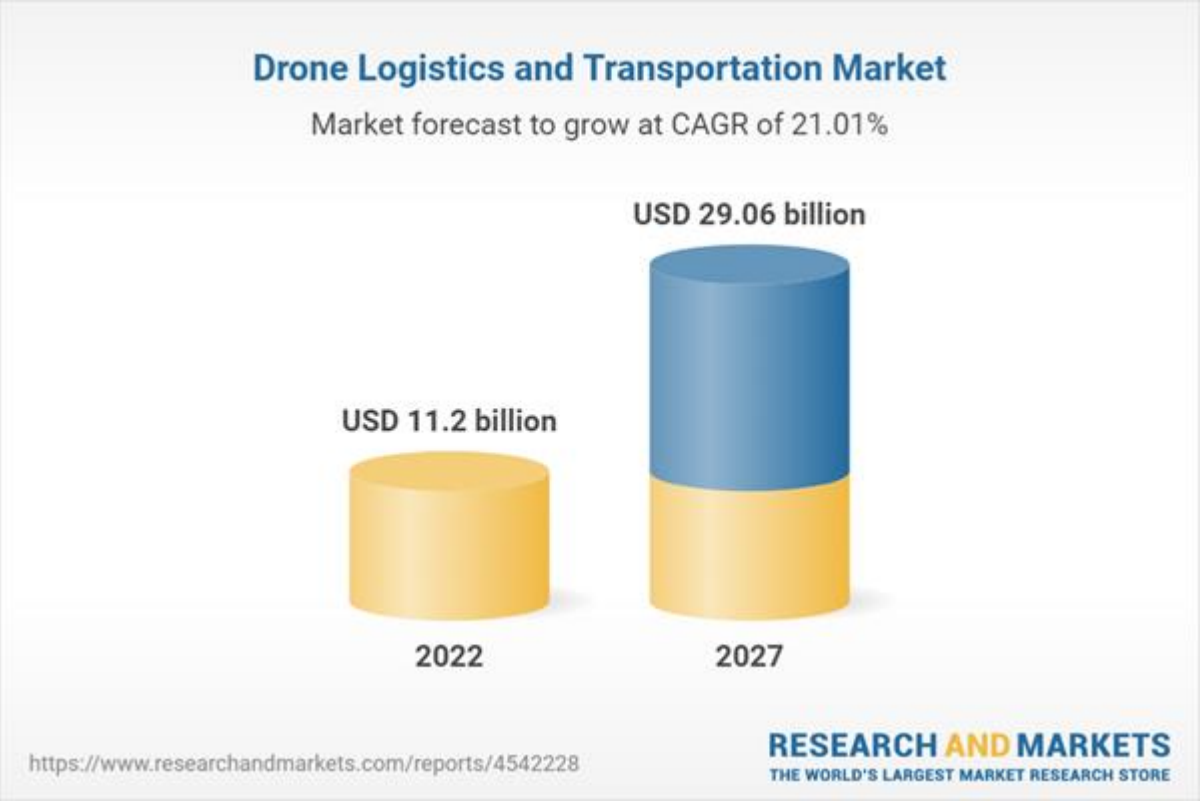
Drones, Why ?

At first, drones were simply an element of entertainment with a medium-high cost for the time, and whose sole purpose was to be a different way of recreation and a fun way to pass the time. People could assemble their drone and customize it to their liking, changing motors, camera, flight controller, adding arms and customizing the drone.

Over time, cameras were incorporated and the great potential it had for advertising was seen, with a different perspective and offering incredible opportunities only similar to aerial shots with more advanced and expensive systems such as helicopters, captive balloons, zeppelins or planes.

They were prehistoric drones. The batteries kept the drone in the air for just 10 minutes and many of them had to be available to be able to carry out longer flights or to be able to carry out some kind of fairly serious work with them. The connection failed many times, and they did not have any security system (today the most advanced devices include anti-obstacle sensors, and artificial intelligence to be able to avoid them and continue their predesigned route).

From that initial model, different generations of Phantom were arriving where the cameras and the flight systems themselves were improved, adding new sensors that made it safer and even navigation systems with which greater security was also provided by being able to control the flight spaces over which the drone could pass. Looking back, the development that has been achieved in just a few years is surprising, but we are convinced that the best is yet to come...



The drone logistics and transportation market is projected to grow from USD 11.20 billion in 2022 to USD 29.06 billion by 2027, at a CAGR of 21.01% during the forecast period. Unmanned aerial vehicles (UAVs) are remotely piloted aerial vehicles that have significant roles in the defense and commercial sectors. UAVs, also known as drones, are increasingly used for border surveillance. They are also used in various commercial applications, such as monitoring, surveying & mapping, precision agriculture, aerial remote sensing, and product delivery.

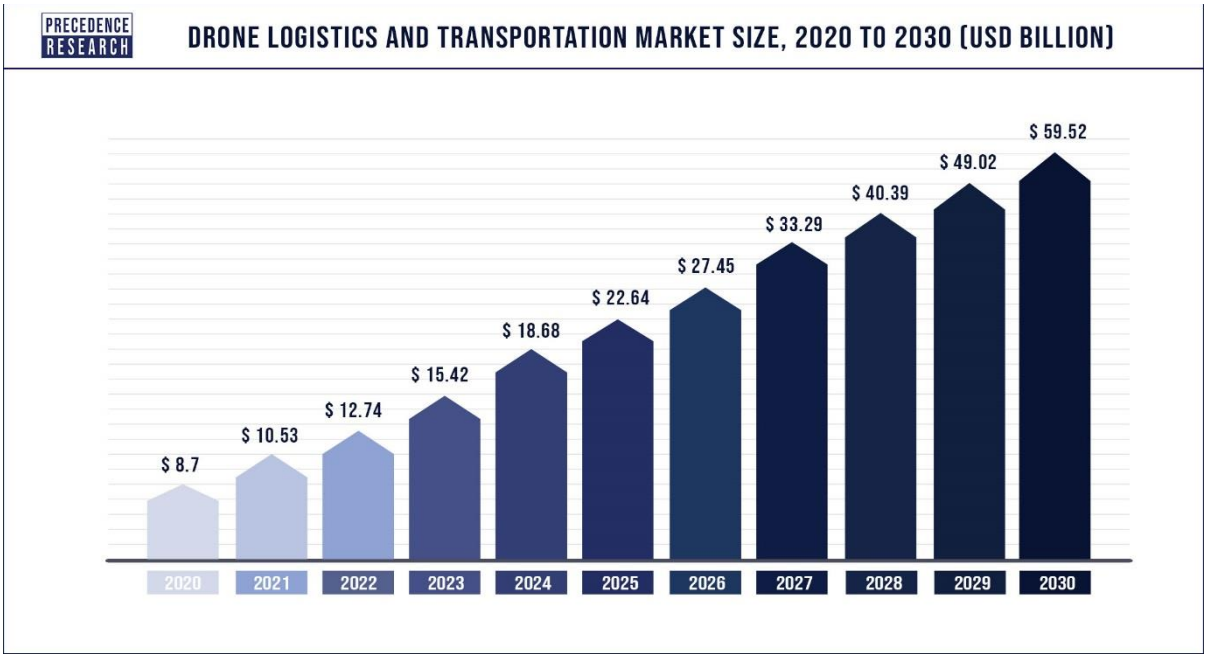
Thus, the increasing use of drones in commercial and military applications is one of the most significant factors projected to drive the growth of the drone logistics and drone transportation market. The European and Asia Pacific regions are expected to be the new revenue-generating markets for unmanned aerial vehicles. Exemptions made by the Federal Aviation Administration (FAA) to allow the use of drones in several industries are also contributing to the growth of the drone logistics and drone transportation market.

The commercial segment is estimated to lead the drone logistics and transportation market in 2022

Based on sector, the commercial segment is estimated to lead the drone logistics and drone transportation market in 2022. The increasing use of drones for various types of applications, such as

inventory management, inventory tracking, parcel delivery, delivery of medical supplies, and food delivery has resulted in the growth of the commercial segment.

Other studies assure even greater growth, but with slightly higher expectations



With rapid development of technology, the drones are now extensively being used in managing the logistics and transporting them to their destination. A large number of companies across the globe have started using drones to manage their supply chain management systems. Drones are also used in mining operations, land survey operations, agriculture land and crop inspections and many more. All these attributes are expected to drive the growth of the Drone logistics and transportation Market.

The drones find their utility in diverse sectors such as warehousing, manufacturing, distribution facilities and many others. In the warehousing facilities the drones are now being widely used in order to monitor the inventory and even sometimes it is used in transporting small items that reduces the use of forklifts and conveyor systems that makes the work cost effective. Therefore, all these beneficial features provided by the drones is anticipated to fuel the growth of the Drone logistics and transportation Market.

The outbreak of COVID-19 has proved to be a blessing for the drone industry. In order to control this outbreak, the most important factor is to maintain social distancing and the drones helped in managing many activities that helped in limiting the physical contact among people such as checking the temperature at various facilities, delivering medical supplies and many others. The versatility with which the drones carry out their operations is one of the primary attributes that has helped in boosting the growth of the Drone logistics and transportation Market.

Furthermore, the food delivery and logistics companies are continuously researching and developing robust technologies that will efficiently make use of drones in the delivery services and this factor is estimated to drive the growth of the Drone logistics and transportation Market. Also, in the military sector the drone technology is being widely used in order to develop combat drones to be used in the

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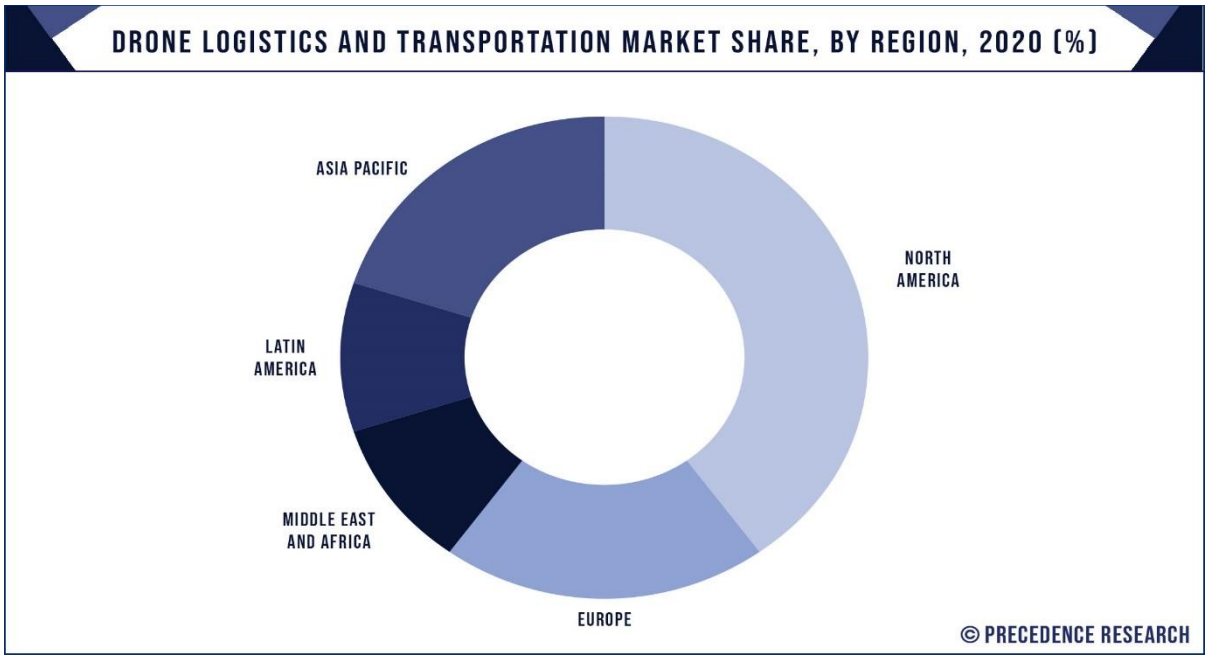
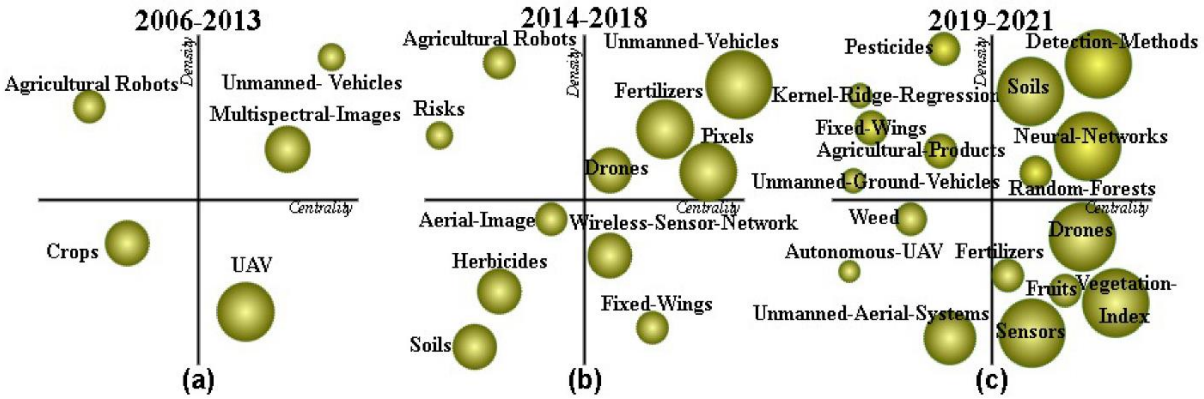
North America is expected to lead the market in the upcoming years because of the rapid adoption of drones in the delivery services in this region. Also, the development of military drones widely used in the combat operations will have a significant impact in the growth of the Drone Logistics and Transportation market.



Why use agriculture drones?

When it's time to deploy drones as part of a farming operation, whether a single vehicle or a whole fleet, it's important for farmers to select high-quality precision agriculture equipment that fits their needs. In the past, drones may have failed to meet users' expectations, as early models were low on automation and lacked the sensor capabilities to truly give farmers the data needed for precision agriculture.

Recent years have changed the precision agriculture technology status quo for the better, with equipment manufacturers' new drone models and payloads being designed with specific farming use cases in mind. The following are just a few of the hardware configurations that can bring futuristic precision farming methods into the present.



Multispectral imaging drones: Using a drone such allows farmers to get a precise aerial view, one that goes beyond the visible spectrum. This drone simultaneously captures standard RGB imagery and a Normalized Difference Vegetation Index (NDVI) to give actionable information about given areas of a field. Its camera supports centimeter-level accuracy, and the drone can be programmed and positioned even in areas without strong internet connections using mobile geographic positioning stations.

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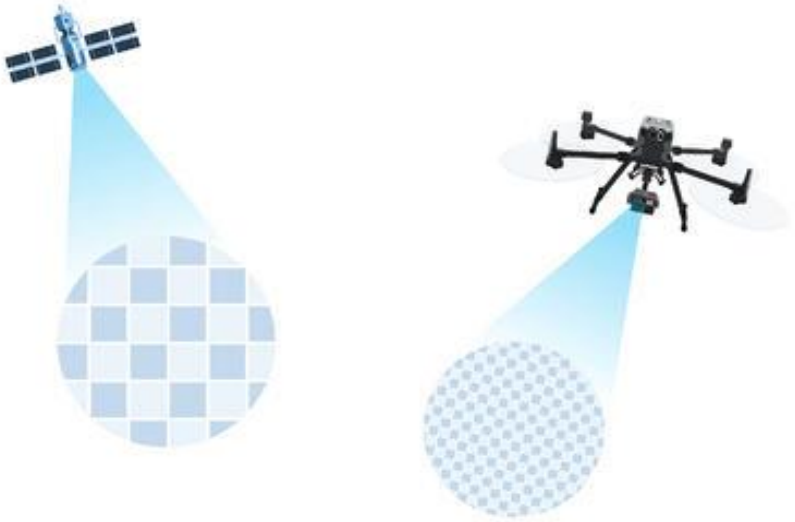
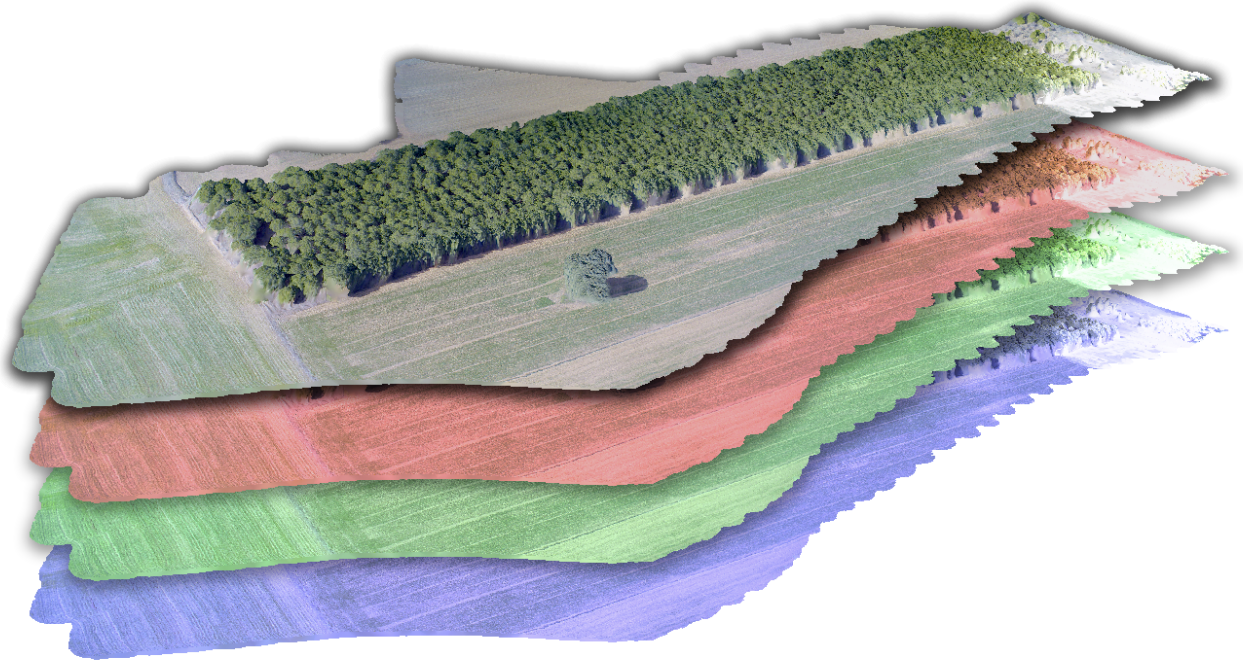
DRONES VS. SATELLITES

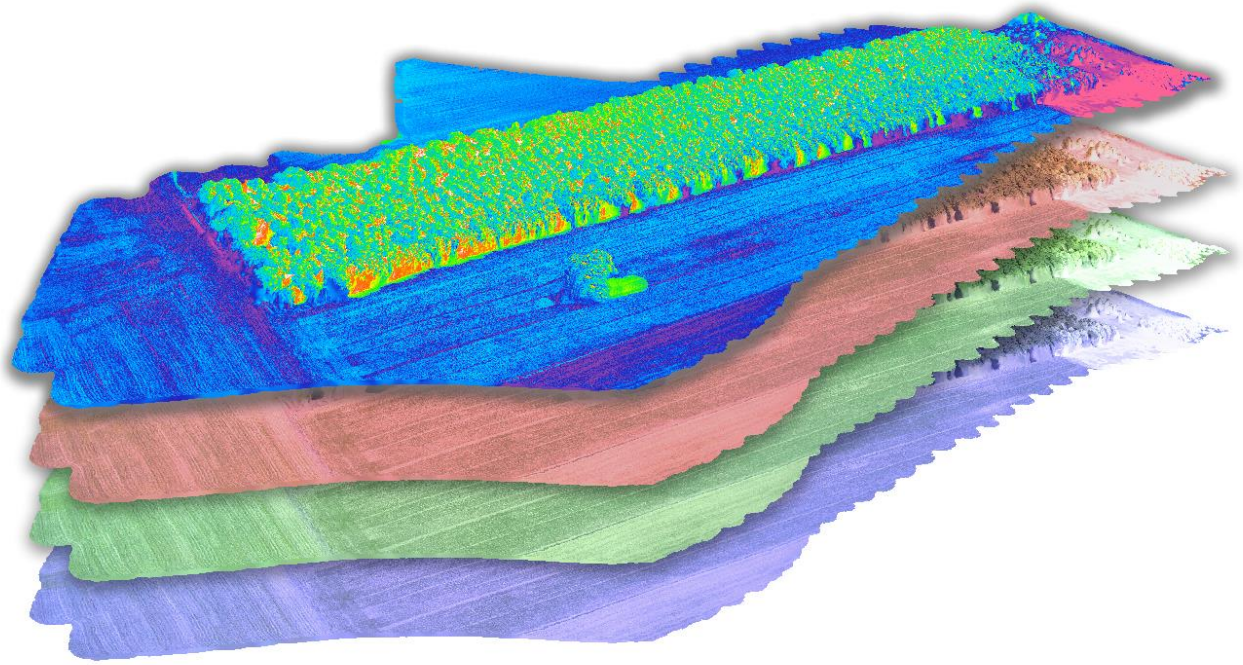


	SATELLITE	DRONE
Cost	High, per use	Low, cost of the drone
Speed	Wait for satellite	Deploy on command
Temporal Resolution	Out-of-date	Up-to-date
Spatial Resolution	25 cm resolution	Centimeter-level accuracy with RTK
Map Area	Unlimited	3 km^2 in one flight*
3D Models and Point Clouds	No	Yes

Precision technology has triggered the agricultural revolution of recent years. Crop monitoring from the air using agriculture drones will undoubtedly drive the future transition to UAS (or UAS) by professional agronomists, agricultural engineers and farmers to more efficiently inspect their crops and carefully plan and manage their operations.



3D POINT CLOUD RGB VIEW



3D POINT MULTISPECTRAL VIEW

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Over time, drones became more and more specialized in different more specific fields, as a natural evolution of the first prototype, dedicated to panoramic photography, aerial video, racing, science and research, surveillance and security. , rescue and rescue and of course, to precision agriculture.

Benefits of Precision Agriculture Drones

Without a doubt, drones can have a significant impact on farming operations, making them a key technology to watch out for. Drones can help farmers modernize their operations and manage crops more effectively.

To that end, using drones can lead to a number of benefits for agricultural providers, which we'll examine here.

Lower Costs

Farming is very costly, with top expenses including fuel, oil, water, electricity, rent, and insurance. For this reason, farmers usually operate on tight budgets and often have to rely on loans and grants to get by. There is no room for wasteful spending.

While drones require capital investment, they are relatively low maintenance, making them an affordable—and very useful—accessory for any serious farming operation. By using drones, farmers can carefully track resource distribution and avoid wasting precious resources.

Reduce Truck Rollouts

Farmers can use drones to efficiently transport products and supplies. This can help reduce reliance on trucks, leading to lower fuel costs and carbon production.

In addition, drones can reach places where trucks can't travel. To illustrate, imagine a team picking vegetables in the middle of a large field. Workers can use drones to transport items at the exact picking location. This can also reduce hauling, which saves time and energy while boosting productivity.

Optimize Crop Yield

Growers today need to track a variety of metrics like chemicals per output, yield per plant, water per output, and estimated production potential. However, this can be very difficult—especially for smaller operations with limited workers. Farmers often struggle to find the time to devote to tracking analytics.

By using drones and farming software, farmers can automate data collection and receive powerful insights. Using this data, it is possible to optimize crop yield.

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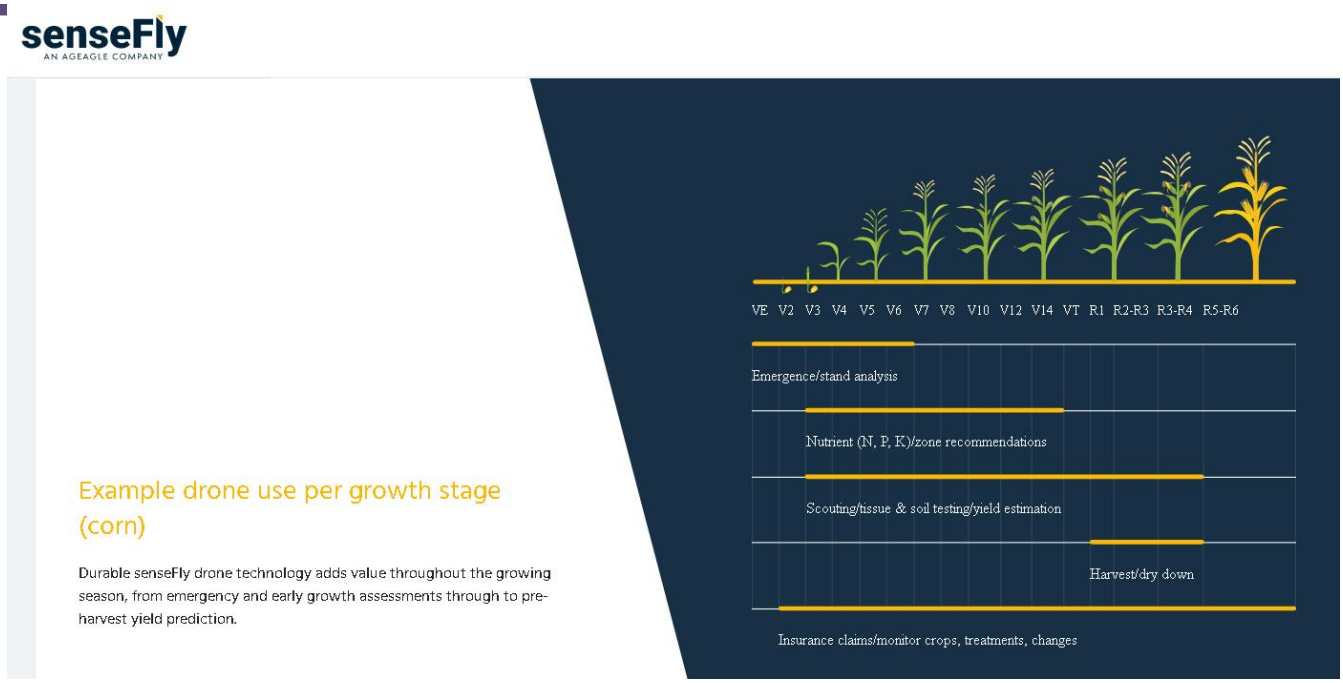

The first models were used and are used today to obtain a reference between the field and the farmer. A high flight allows a result of much higher quality than the average satellite services, with the advantage of the immediacy of results and the time lapse, being able to take references on favorable days in optimal conditions, guaranteeing an ideal result, leaving a little aside the meteorological problem of large satellites, as drones operate below the clouds at all times.

The next step in the evolutionary scale of drones was the conversion to a professional, geo-referenced system that would allow a greater point of control on the ground and more detailed and precise information.

Systems for mapping and creating virtual routes to obtain orthophotographs are here to stay and offer farmers a geo-positioned map of their land where they can read and interpret the data taken from above.

The most demanded and popular system has been that of RGB cameras (for its acronym in English Red, Green and Blue) of primary colors, giving the sum of the three photorealistic images and with correct colors, similar to those captured by the human eye. , which allows us to distinguish colors, shapes and patterns, which can represent signs of low productivity and be a problem in the long run.

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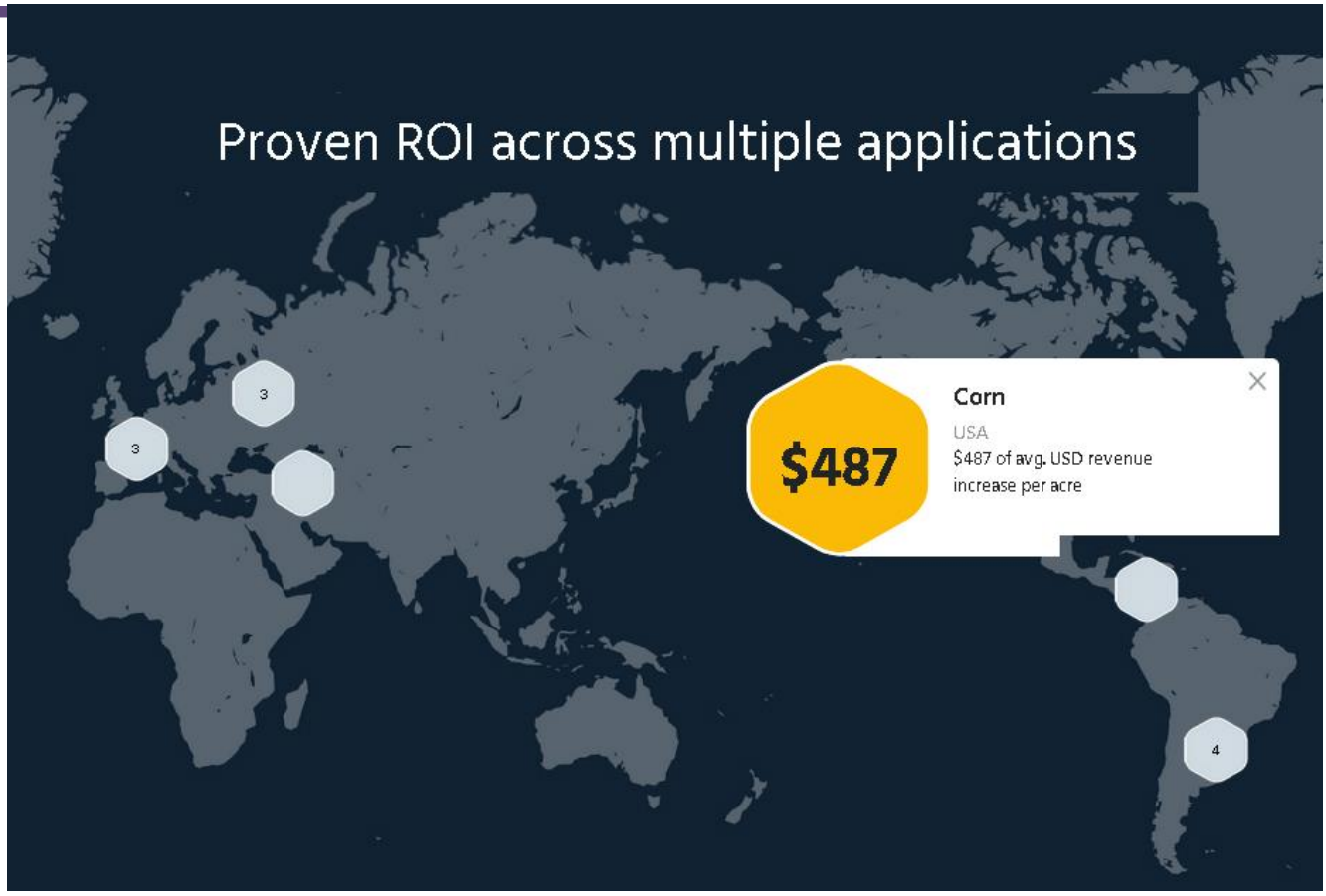
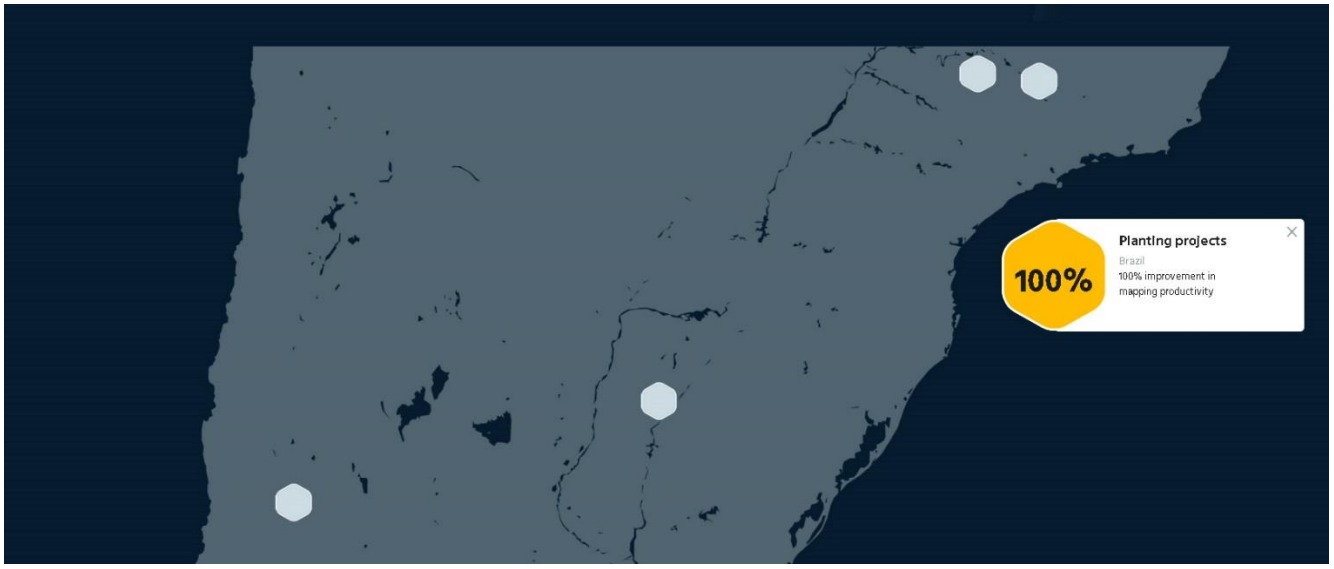
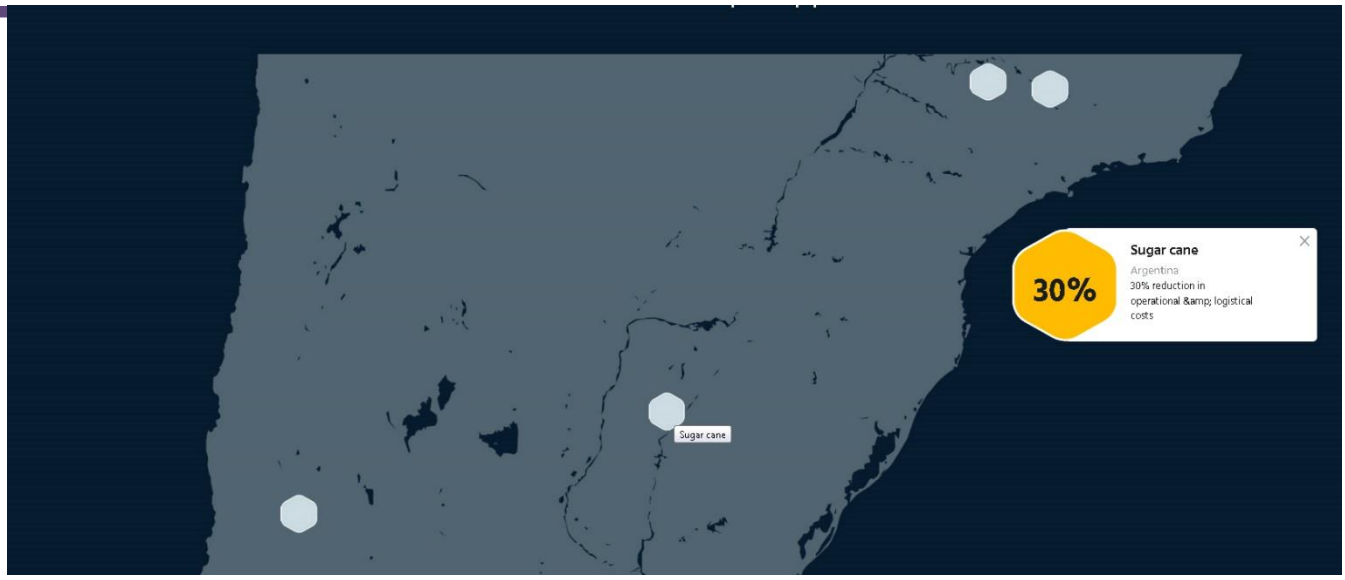

Proven ROI across multiple applications
3
3
4
$487
Corn
USA
$487 of avg. USD revenue increase per acre

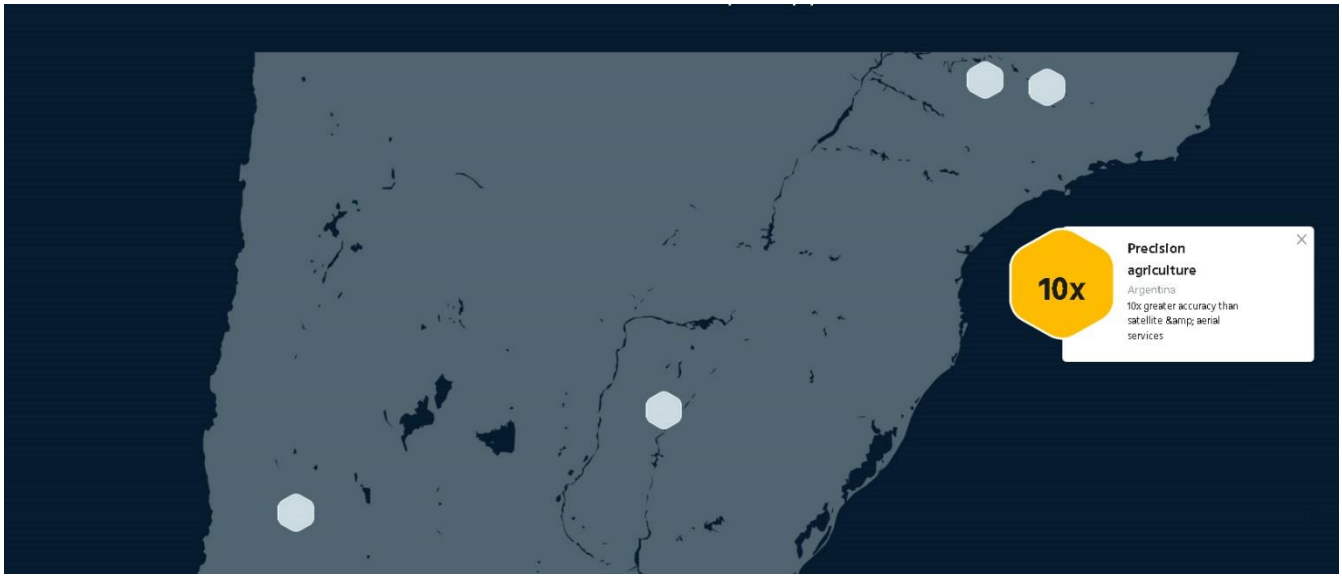
16


3
3
4
30%
Sugar cane
Colombia
30% reduction in weed control inputs

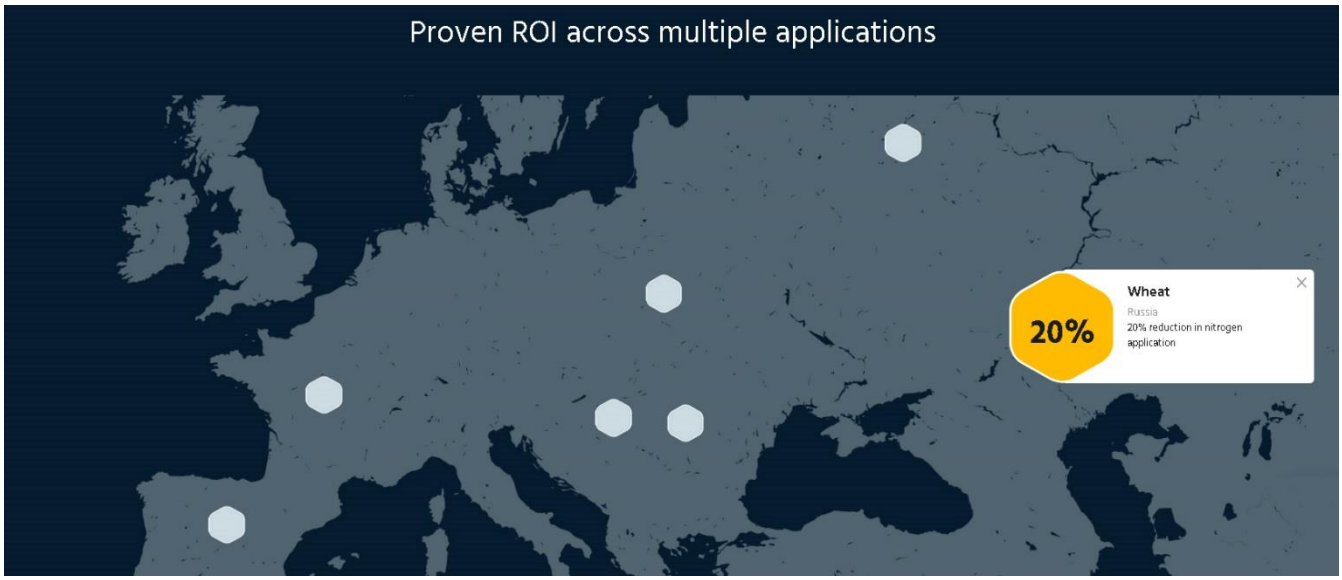

100%
Planting projects
Brazil
100% improvement in mapping productivity

17


Sugar cane
30%
Sugar cane
Argentina
30% reduction in operational & logistical costs


10x
Precision agriculture
Argentina
10x greater accuracy than satellite & aerial services


3
3
4
1
500 square
kilometres survey
Iran
500 sq. km mapped in 1
month


Proven ROI across multiple applications
20%
Wheat
Russia
20% reduction in nitrogen
application

One of the most demanded and aided sensors due to its ease of use and immediate results is that of RGB cameras. With them, you can feel what it would be like to fly like a bird, because the drone emits a coded video signal (by Wi-Fi or by other more professional and secure link systems) that It links the camera in the air with the control command on the ground, broadcasting images in real time most of the time through the smartphone connected to the control command and a specific application.
In addition to allowing photo and video recordings, with their different configurations (
Data such as flight telemetry, distance and height of the aircraft in relation to its take-off zone and/or the pilot, altitude, remaining battery level, GPS coordinates, general status of the RPA, blocked satellites and different anomalies that could affect the drone warn the pilot so that he can take appropriate measures or maneuver accordingly and responsibly to complete the flight safely.

To capture images or videos, what is commonly called a camera is used. this term refers to any light sensor that is capable of recording specific information and can be used later. These cameras are

usually small so as not to interfere with the flight of the device, but there are very high-tech elements that take up very little space and are capable of recording 4K videos and photos of up to 48 MB.
Even so, any type of camera uses the same physical principle that consists of a device capable of interpreting light and fixing an image (photography) or a series of them (Video) Be it RGB, MULTISPECTRAL, INFRARED, ETC...

Multirrotor

DJI PHANTOM 4

Drones such as the DJI phantom 4, weighing 1380g and measuring 350mm diagonally with a maximum viewing resistance of 10m/s, with an estimated flight time of 28 minutes, and an operating range with temperatures between 0° and 40° with GPS/GLONASS system and a satellite positioning system of ±0.1 m (with vision positioning) or ±0.5 m (with GPS positioning)Horizontal: ±0.3 m (with vision positioning) or ±1.5 m (with GPS positioning) and a 1/2.3” CMOS sensor with 12.4MP effective pixels make it a very good candidate for performing a photogrammetric flight to obtain orthophotography. Even from a 3 d mapping.

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Similar to this we can find smaller and more efficient drones such as

the mavic 2 zoom and pro

Multirotors, foldable, great photographic quality and configurable

Characteristic:

- Mavic 2 drone with 24mm to 48mm optical zoom camera
- 12MP 1/2.3-inch CMOS sensor
- Video quality up to 4K
- 10 km range and 1080p video transmission
- 31 minutes of maximum flight time
- Omni directional obstacle detection in 5 directions
- Super resolution photos up to 48 MP
- FHD video with up to 4x lossless zoom
- One Touch QuickShots: Dolly Zoom Effect, Hyperlapse, ActiveTrack, Panorama, Waypoint, Asteroid, Boomerang, etc.
- Capture photos in HDR for better quality
- Dual transmission in 2.4 and 5.8 GHz
- 8 GB internal storage (expandable)
- 905 grams of weight

DJI PHANTOM 4 MULTIESPECTRAL

Ready to fly, with only 1487 g of weight (Category C2) and a range of 27 min per battery, the phantom 4 RTK is presented as a very good and efficient alternative for the optimization of precision agriculture. Its integrated RTK system allows an error of 10 cm of difference with the virtual positioning of the device, both horizontally (distance) and vertically (height) thanks to the systems from which it obtains GPS + BeiDou + Galileo (Asia) references;

GPS + GLONASS + Galileo (other regions

Data collection speed Maximum operating area of 0.63 km2 for a single flight at an altitude of 180 m, for example, the GSD is approximately 9.52 cm/pixel, with a vertical overlap ratio of 80% and a ratio of 60% lateral overlap. During this flight, the battery will discharge from 100% to 30%.

Six 1/2.9" CMOS sensors, including one RGB sensor for the visible spectrum and five monochrome sensors for multispectral imaging.

DJI MAVIC 2 ENTERPRISE ADVANCE

Takeoff weight (without accessories)909 g
• Max. take-off 1100 g
• Dimensions (length × width × height)
• Folded: 214 × 91 × 84 m Unfolded: 322 × 242 × 84 mm
Unfolded + Spotlight: 322 × 242 × 114 mm Unfolded + Beacon: 322 × 242 × 101 mm
Unfolded + Speaker: 322 × 242 × 140mm Unfolded + RTK Module: 322x242x125mm
• Diagonal distance 354 mm
• Max speed. climb rate6 m/s (S mode)5 m/s (P mode) 4 m/s
• (S mode with accessories) 4 m/s (P mode with accessories)
• Max speed. descent rate Vertical descent 5 m/s (S mode) 4 m/s (P mode)
Tilt 7 m/s (S mode) 4 m/s (P mode)
• Max speed. 72 km/h (S mode, no wind) 50 km/h (P mode, no wind)
• Height max. of service above sea level 6000 m

Mavic 3

Recently (April 2022) the new Mavic 3 has been released, also from the DJI house with more than remarkable characteristics

• Takeoff weight Mavic 3: 895g
Mavic 3 Cinema: 899g
• Dimensions (folded/unfolded) Folded (without propellers) 221 × 96.3 × 90.3 mm (length × width × height)
Unfolded (without propellers) 347.5 × 283 × 107.7 mm(length × width × height)
• Max. flight (no wind) 46 minutes
• Max. in hover (no wind) 40 minutes
• Max. Of flight 30 kilometers
• Resistance max. to the wind 12m/s
• Operating temperature −10 to 40 °C (14 to 104 °F)
• GNSS GPS + Galileo + BeiDou
• internal storage Mavic 3: 8 GB (available space is approx. 7.2 GB)
Mavic 3 Cine: 1TB (available space is approx. 934.8GB)
• sensor CMOS 4/3, effective pixels: 20 MP
• Goal Field of view: 84°
Equivalent format: 24mm
Aperture: f/2.8 to f/11Focus: 1 m to ∞ (with autofocus)
•Digital zoom 4x
• Battery Type LiPo 4S
• weith 335.5g
• Charge temperature 5 to 40°C (41 to 104°F)
• Type of load Charge three batteries in sequence.
•Loading time Approx. 96 minutes
• Charge temperature range 5 to 40°C (41 to 104°F)

But it would be a mistake to limit ourselves to only one type of manufacturer and model with an absolutely incredible availability of different manufacturers offering different solutions.

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Autel Robotics is a relatively new brand (it appeared on the market in 2017) but it has entered the market with a bang with foldable, interchangeable camera drones up to 8K

AUTEL EVO II DUAL 640T

Unique foldable drone with interchangeable camera
- Dual Thermal Chamber
- Thermographic resolution of 640×512.
- 8k RGB camera with Zoom x8 (and x4 without loss).
- Applications in security and surveillance, search and rescue, infrastructure inspection.
- 360º anti-collision protection
- Maximum speed 72 km/h
- Transmission range 9 Km
- Autonomy: 40 minutes of flight
- Intelligent flight modes
- GNSS: GPS + GLONASS
- Quick start guide and manual
- We offer Official Technical Service

Features of the EVO II Drone
- Weight: 1127 - 1192g
- Diameter 397mm
- Maximum speed: 15 m/s (standard) 20 M/s (ludicrous)
- Autonomy: 40' planning and 35' moving
- Maximum distance 9,000m
- Maximum height 7,000m
- Transmission: 2.4Ghz Alink
- 8Gb internal storage. SD 128Gb max
- LiPo 3S 7100mAh flight battery
- Control screen 3.3" OLED 330Nits

• 5000mAh controller battery
• GNSS: GPS + GLONASS
• Intelligent flight systems
• 12 omnidirectional vision sensors
o Ranges from 0.5 meters to: Front: 40m; Rear: 32m; Top: 24m; Bottom: 22m and Side: 24m
o Field of Vision: Horizontal 60º and Vertical from 50º (Top and Bottom) to 80º (Front and Back)

Another notable in the world of technical inspections is the French PARROT, the first drone on the market that has 4G technology, which allows it not to depend on a control station limited by the distance of the frequency, since it works with mobile satellite technology. With its new ANAFI, the difference and sense of innovation of this brand is surprising with its futuristic models that completely break with the line to which other houses had accustomed us. It allows us to create native flight plans from the app itself for greater efficiency and functionality.

PARROT ANAFI

ANAFI Ai shoots twice as fast as Autel EVO 2 and DJI Phantom 4 Pro v2.
• 1/2″ 48 MP CMOS sensor. 8,000 x 6,000 effective px.
• 4K video at 60fps
• HDR10 – HDR8
• Dynamic range of 14 EV.
• 6x zoom: Details from 1 cm to 75 m.
• H.264 (AVC) and H.265 (HEVC) formats.
• Compatible with the PIX4D suite.
• Photogrammetry flight modes available in FreeFlight 7 and OpenFlight.

- One-click flight plan creation.
- 48 MP photos at 1fps – twice as fast as the competition.
- Survey-grade accuracy: 0.46 cm/px GSD at 30 m (100 ft).
- 4G transfer in flight to PIX4Dcloud.

PARROT BLUEGRASS FIELD

Folding drone, up to 25 minutes of autonomy that allow it to cover up to 30 ha per battery at 70 meters high. It is foldable and has autopilot.

COVERAGE AREA: 30 ha per battery at 70 m altitude

Range: Up to 2 km with the Parrot Skycontraller 2, in an area without interference or obstacles

- Terrain resolution: 6.6 cm/px at 70 m altitude

- Automatic flight plan through the Pix4Dcapture mobile application

vertical takeoff and landing

GENERALITIES

- Weight: 1850g

Size: 50*44*12cm

Removable propellers for easy transport

PHOTOS AND VIDEO

• Photo: 14MP wide-angle camera

1080p Full HD video

• Video streaming: 360p/720p

• Internal video memory: 32 GB

WIFI AND TRANSMISSIONS

• Range: Up to 2 km with the ParrotSkycontroller 2, in an area without interference no obstacles • Wi-Fi type AC, 2 dual-band antennas (2.4 and 5 GHz)

HIGH CAPACITY BATTERY
Altimeter Ultrasound Altimeter Ultrasound Battery life: 25 min 6700 mAh lithium polymer battery SENSORSIntegrated GPS + GLONASS Heritage Navigation System (INS)

ANAFI THERMAL

Version with thermal camera, small, smart, robust, foldable and light.
Folded size: 218x69x64mm
Unfolded size: 242x315x64mm
Weight: 315g
Maximum transmission distance: 4 km with Parrot Sky controller 3
Maximum flight duration: 26 min
Maximum horizontal speed: 55km/h
Max Vertical Speed: 4m/s
Maximum wind resistance: 50km/h
Maximum flight altitude: 4500 m above sea level

Operating temperature: -10 to 40°C
GNSS: GPS + GLONASS
Barometer and magnetometer Vertical camera and 2×6-axis ultrasonic sensor
IMU Accelerometer 2×3 axes
2×3 axis gyroscope

ANAFI U.S.A.

Professionalized version for surveillance and security, it has an integrated 21 MP camera with x32 zoom and withstands winds of up to 52 km per hour.

- FLIR Boson Thermal Camera 320×256
- 32x zoom
- 21 Megapixel camera
- 32 minutes of flight time
- 4km transmission range
- supports up to 52km/h of wind
- Drag and drop an RTH point on the map
- Easily interfaces with Pix4Dcapture and Pix4Dreact solutions (fast offline 2D mapping)

- Weight: 485g
- Maximum transmission range: 4km with the Parrot Skycontroller 3
- Maximum flight time: 32 minutes.
- Maximum horizontal speed: 14.7 m/s (52.92 "km/h)
- Maximum vertical speed: 6 m/s (21.60 km/h)

• Maximum wind resistance: 14.7 m/s (52.92 km/h)
• Service ceiling: 6,000 m above MSL (mean sea level)
• Optional altitude fencing and geofencing
• Operating temperature: - 35 ° C to 43 ° C
• No takeoff temperature limit
• Manage your data privately between drones and devices OR share anonymous data on secure European servers

DIMENSIONS:
• Folded size: 252 x 104 x 82 mm
Unfolded size: 282 x 373 x 84 mm

SENSORS
• Satellite navigation: GPS, GLONASS and GALILEO
• Barometer and magnetometer
• Vertical camera and ultra sonar
• 2 x 6 axis IMU
• 2 x 3 accelerometers per axis
• 2 x 3 gyros per axis

Yuneec is another Chinese brand and although it does not reach the sales levels of Dji, it does not detract at all due to its high technology applied to the drone world, with improvements and technologies that are sometimes much superior to those of the quintessential Asian giant.

YUNEEC H520 E

The H520 has been designed with industry and professional flying in mind, with its six-rotor flight system it provides safe (can fly even with a failed motor or propeller), stable and precise flight. Cameras of various types can be incorporated depending on the work needed to be carried out, allowing the flight to greater distance from objects and at the same time store and instantly transmit both telemetry, GPS, video and photography data to the ground station. ST16S.
Even in strong winds. In professional jobs we cannot depend on meteorological factors to carry out the required work, it is even possible that the flight is essential in adverse meteorological circumstances. The H520 is capable of flight even when missions with piloted planes and helicopters cannot be flown.

Automatic Flight Speed Control offers the lowest possible flight speed when ultra-precise monitoring of wide areas is required.
Hot swap option.
All Yuneec E-series cameras and the CGOET multi-thermal and multi-spectral camera can be hot-swapped on the H520, saving time and providing utility, no need to reboot the drone after a camera change. This also allows data to be securely stored on a single device (The ST16+ Ground Station). Whether capturing thermal imaging data, such as focal lengths, etc. Even memory cards can be swapped from device to device.

Folding landing gear, so as not to disturb the rotation of the cameras, in this way the rotation of the camera cannot be independent of the position of the drone.

Ground station with integral control ST16+

The ST16S ground station is an integral transmitter and receiver that gives you full control of the H520 during flight and allows pilots to capture photos and videos with ease. With an integrated 7-inch screen, the ST16S controller is Android based and displays real-time images of the flight, eliminating the need for an external device. It can also be used to plan missions. Plan your flight with the touch screen and carry out your mission with the push of a button.

ST16S TRANSMITTER & DATAPILOT™

The new Android-based ST16S is equipped with a fast Intel Quadcore processor and thus has sufficient power reserves for new high-performance flight applications. The 7" high-brightness display with enhanced touchscreen ensures precise and intuitive control of the H520 and shows you all flight information and live image from your camera in 720p HD. The included DataPilot™ app is a complete flight control solution. software for planning waypoints The application is fully integrated into the H520 hardware and software The DataPilot™ software system allows users to efficiently and consistently create orthomaps, 3D scans, image crop data, or kinematic motion for trajectories repeatable and recoverable flight data without the need for costly third-party software Monitoring, construction measurements, BIM components, perimeter security, accident scene reconstruction, forensic capture, 3D scans, orthomosaics, and photo-stitching are generated accurately and efficiently via DataPilot™ interface Stored for later retrieval/reflow, or scheduled Or outside from the site and transported to the control system via email, thumb drive or micro-SD card. DataPilot™ auto-generates survey paths with user-defined overlapping, and cross-shading for 3D or large-format image output. Users can define a topographic resolution through altitude or inches-per-pixel decisions, providing a platform that is capable of flying even in low-altitude scenarios. DataPilot™ also enables caching of maps from many map providers for access in areas without connectivity, and provides tools for precise waypoint placement even in areas where up-to-date maps are not available.KIT DE

SOFTWARE DEVELOPMENT (SDK)

The SDK provides a wide range of interfaces for programming the H520, allowing users to develop individualized applications for the H520 and implement application-specific functionality. In this way, the H520 can be tailored to the specific needs of the user for optimal results.

MAIN FEATURES

- HV batteries with up to 28 minutes of flight time
- Different camera options
- Precision compass
- SDK compatibility

- 2D / 3D mapping capability
- Waypoint, Survey Mode, Point to Fly (including offline maps)
- Low operating noise
- Painted in special orange for greater visibility
- Service packages available
- Efficient energy
- High satellite coverage (GPS, GLONASS, GALILEO)

Designed for professional, commercial and government requirements.

6 rotors for high safety and redundancy as well as high stability and accuracy even while experiencing wind and turbulence

Takeoff weight with all available camera systems (E90 / E50 / CGOET) below 2 kg

Reliable position determination by evaluating GPS, Glonass and Galileo satellites

High-precision, low-interference compass

Good visibility thanks to bright orange paint.

Video downlink encryption according to the WPA2 standard with a dynamic password with no data transfer to an external server
The software is based on solid PX4 code
Avoid intelligent sonar collisions to fly safely and without stress
• ST16S with an integrated 7" touchscreen, voice output, and comprehensive multilingual DataPilot™ software
• HDMI signal directly from the ST16S to output the drone's live image on larger monitors
• Mission planning on PC or ST16S, offline maps available, own map creation possible
• Checkpoint and inspection missions, including cross flights, suitable for construction inspections, perimeter security, accident reconstruction, 3D scans, orthomaps, area inspections and S&R tasks
• 2D / 3D mapping
• DataPilot ™ automatically generates the flight path when an area to scan is specified, including a possible battery change.
• Definition of resolution in inches per pixel or altitude
• Missions can be saved for any repetition of the same flight path (for example, for follow-up shots)
• SDK available: third-party software and adaptation to your own application is possible.
• Capable of being tethered (sold separately)
• Less space required and short preparation time
• Retractable landing gear and 360-degree endlessly rotating camera gimbal for precise alignment or permanent panoramic view, even during anchoring
• Hot-swappable gimbal/camera systems
It also has interchangeable cameras

34 *Cámera E90*

4K resolution at 60 frames per second.

It is ideal for professional cinematographic applications, mapping and 3D modeling as well as search and rescue.

Low distortion 23mm lens.

Includes lens adapter ring to mount standard 40.5mm ND filters

Includes a 3-axis stabilized gimbal with an accuracy of +/-0.02º

35 *Camera E50*

With 12mp 1/2.3" sensor
4K resolution at 30 frames per second.
Ideal for inspection of telecommunication towers, wind turbines and other vertical constructions.
40mm lens allows for capturing important visual details while maintaining a safe distance from construction

Cámera multitérmica CGOET

This extraordinary camera allows thermal imaging and low-light imaging.
Perfect for solar inspections, public order, fire, search and rescue and construction.
The 1080px camera is capable of capturing dim light 20 times better than a human.
The low light camera is combined with the thermal imaging camera to overlay IR and RGB into a clean and precise image. It will capture infrared and video images with an identical position and using a single flight plan.
Adjustable temperature detection
Measurement and display of temperatures
Various color spectra allow accurate visualization of heat sources

E10T

- • Thermal imaging and residual light camera
- • Thermal resolution of 320x256 or 640x512
- • Double video transmission
- • Compatible with the H520 hexacopter
- • Up to 28 minutes of flight with the H520

- • Hot swap gimbal
- • 360° continuous gimbal rotation
- • Full camera control via the ST16S
- • Supports DataPilot and mission planning
- • Invaluable for Solar Inspections, Law Enforcement, Fire, Search and Rescue, and Construction

E30Z

- • 30x optical zoom / 6x digital zoom
- • Automatic focus
- • Demisting
- • Compatible with YUNEEC H520 hexacopter
- • 3-axis gimbal
- • Unlimited 360° yaw rotation
- • 1080p video resolution
- • 2.55s zoom speed (wide to telephoto)

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FIXED WING

Parrot disco Ag EDITION

The all-in-one drone for high-precision agriculture
Parrot Disco-Pro AG is a versatile and compact drone with a comprehensive solution designed to improve the performance of agricultural operations. With this complete solution, farmers and small cooperatives can easily monitor the status of their crops thanks to visual surveillance and NDVI (Normalized Difference Vegetation Index) maps. Parrot's complete offer, made up of a drone, a high-precision sensor, flight planning software and a solution for processing and analyzing the data collected, allows farmers and small agricultural cooperatives to access precision agriculture. with a flexible, effective, affordable and easy-to-use solution that will help them make decisions about their crops. The offer, designed around the Parrot Disco flying wing and adapted to professional use, includes the Parrot Sequoia multispectral solution, the Parrot Skycontroller 2 long-range remote control and the Pix4Dcapture automatic flight planning application. In addition, it allows access to complete reports with the AIRINOV FIRST+ cloud platform.

SAVING TIME FOR CROP INSPECTION

Speed up crop inspection from the sky

So that the inspection of crops is not a difficult and time-consuming operation, Parrot facilitates the work of visual supervision of agricultural holdings with its drone solutions.

The analysis of images and videos that are taken during the flight of the drone instantly provides a panoramic view of the plots without having to cover the entire terrain.

Parrot drones can be piloted manually without experience or can plan automatic flights to map specific areas of terrain.

Parrot solutions simplify the day-to-day life of farmers who want to analyze their crops.

The data recorded by the drone is processed to map a parcel. Farm operators thus have NDVI and zoning maps available in just a few hours after the flight. These maps constitute a precise x-ray of the entire plot in order to analyze the state of health of the vegetation.

In this way, Parrot solutions help farmers to better identify the health of the vegetation in order to make sound decisions based on plot data.

Parrot technologies at the service of the farmer

Parrot solutions are designed to be very easy to use. With integrated technologies, piloting drones is within everyone's reach.

With a mobile phone and Parrot Skycontroller 2, the farmer can manually pilot the drone to inspect his farm or plan an automatic flight over his plots..

Analyze plots and make decisions independently at the right time

With Parrot solutions, farmers can be more independent in analyzing their plots without having to resort to external service companies.

Thanks to the data recorded with the Parrot solution, they will be able to quickly analyze their plots, identify the areas that present a problem and make the right decision to intervene without delay.

- Type: Fixed Wing/Aircraft
- Autonomy: 80 ha at 120 m
- Range: Up to 2 km
- Live connection: Yes, Wi-Fi (2 bi-band antennas, 2.4 and 5 GHz)
- Flight planner: Yes, Pix4Dcapture
- Battery: 2700 mAh / 25A 3 Lipo cells
- Battery life: 30 minutes
- Dimensions: 59x41x 28 mm
- Weight: 940 gr (780 g + 107 gr (Sequoia) + supports)
- Internal memory: 64 GB

Sensors

- visible sensor
- • Front RGB camera: 12 MP Full HD
- multispectral sensor
- • Parrot Sequoia bottom multispectral camera

Others:

- Air speed sensor (Pitot tube)
- GPS + GLONASS
- Inertial navigation system
- Altimeter
- Ultrasound

SENSEY FLY **eBee Ag**

Map your crops in minutes

With its dual-purpose sensor, eBee Ag captures accurate RGB and multispectral data from the sky to help you make better decisions on the ground. Regular multispectral data collection is essential for effective crop health analysis and helps you detect early indicators of diseases and pressures that threaten crop yields, such as pests and weeds. Highly accurate index maps allow you to understand each acre while managing problem zones across the field, before they get out of control and affect profits.

Farms and fields vary in size and shape, but eBee Ag makes exploring and monitoring your crops quick and easy. Simply use the included eMotion flight planning software, plan your mission, and launch the drone. The eBee then collects the data and lands at the designated landing point automatically. Additionally, eBee Ag data outputs are fully compatible with all major Farm

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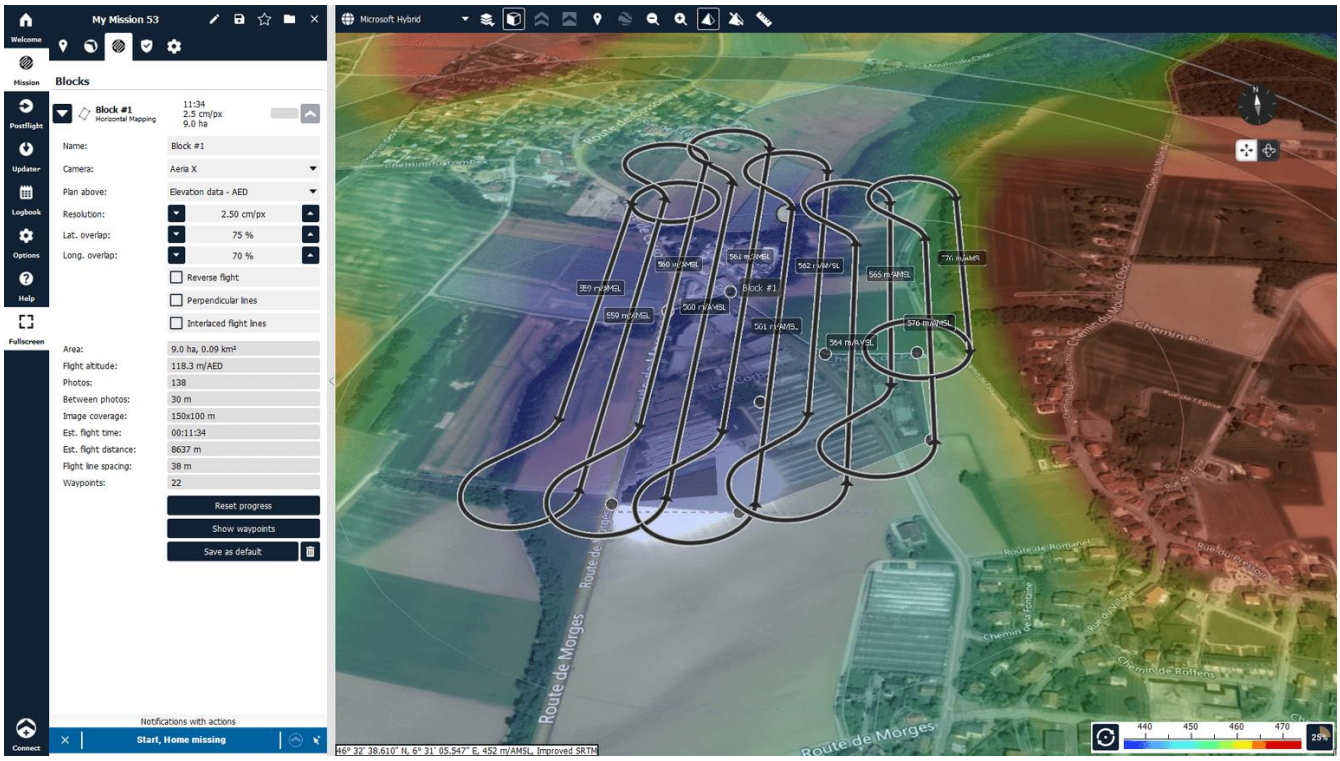
Management Information Systems (FMIS) and precision farming equipment. Create variable-rate prescription maps to precisely apply supplies where they're needed most, while protecting your investment and resources.

Reduce operating costs

Whether you manage a single field, are part of a cooperative, or work as an agricultural service provider, you know that monitoring fields takes time and manpower. Fortunately, eBee Ag helps solve these problems.

Proven, rugged and reliable in extreme environments around the world, the eBee Ag is suitable for intensive and frequent crop mapping missions. Its standard 55-minute flight time can cover 395 hectares (160 acres), while live air traffic data helps you cover more ground in far less time than traditional scanning alone. This time savings allows you to manage field trips and other operational resources more efficiently. And all of this is backed by professional, localized support from senseFly.



43 WORK DRONES

DJI Agras MG-1

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Chinese manufacturer has recently presented its first drone intended for strictly agricultural tasks. This is the DJI Agras MG-1, an 8-rotor multicopter designed for fumigation tasks. One more step for DJI in the RPAS sector for professional use.

In the absence of complete technical specifications, compared to the classic DJI models, the Agras MG-1 stands out for its transport capacity. Obviously we are talking about platforms with very different purposes, but transporting 10 kg of pesticide at a speed of 8 meters per second is not negligible. Added to this capacity is a yield of 4 hectares per hour.

The MG-1 has a sophisticated control system and a microwave radar positioning system that makes it possible to spray at the same height with respect to the plants and thus ensure the uniformity of the treatments. The control system also allows fumigation to be restarted at the same point where it was interrupted.

Yet what is striking about the MG-1 is its cooling system. A centrifugal system that takes advantage of the structure of the drone (its arms are hollow) to distribute the air captured and filtered from the central body to each of the motors. According to the manufacturer, this system will allow the useful life of the motors to be multiplied by three.

44 Agras MG1PRTK

For high precision agriculture Innovative perspective. improved efficiency

The Agras MG-1P is a drone equipped with 8 motors and 8 propellers, with a built-in tank to transport up to 10 liters of pesticides or fertilizers or with an optional 13L hopper for the dispersion of dry material such as seeds or fertilizers. between 0.5mm to 5mm.

To carry out the spraying of the liquid, it has 4 nozzles, each one strategically arranged in the lower part of an engine, so that the air generated by the propellers drives the spray, making the sprayed product spread evenly and extend its contact area to throughout the field.

The powerful MG-1P can fumigate a field of up to 6,000 m2 in just 10 minutes, which means a great reduction in time and manpower.

During the fumigation process, the Agras MG-1P has the ability to vary its speed up to a maximum of 8 m/s, a fact that allows the modern spray system to adjust the flow of the substance to be applied,

with which it is possible to maintain rigorous control of the amount of fertilizer or pesticide used, minimizing costs, time and reducing environmental pollution.

For dispersion of dry material such as seeds or fertilizers with a diameter of 0.5mm to 5mm, the dispersion speed is controlled by the built-in concentrating device and the hopper door, and by the DJI MG app. parameters such as the hopper outlet size and the rotational speed of the rotary disk can be set.

The RTK system houses centimeter-high precision positioning and navigation technology and high resistance to electromagnetic interference.

Agras MG1S (DLG60A)

AIRCRAFT FRAME

Diagonal Wheelbase	1515 mm
Frame Arm Length	625 mm
Dimensions	1471 mm×1471 mm×482 mm（arm unfolded, without propellers） 780 mm×780 mm×482 mm（arm folded）

The Agras MG-1S integrates a number of cutting-edge DJI technologies, including the new A3 Flight Controller, and a Radar Sensing System that provides additional reliability during flight. The spraying system and flow sensor ensure accurate operations. When used with the MG Intelligent Operation Planning System and the DJI Agriculture Management Platform, a user can plan operations, manage flights in real-time, and closely monitor aircraft operating status. The MG-1S is a high performance aircraft capable of offering comprehensive solutions for agricultural care.

Agras T10

DJI AGRAS T10 is designed for precision agriculture

Thanks to the 10L tank, the T10 phytosanitary drone can spray up to 5 meters with a land cover of up to 7ha per hour of operation. The new design of the Agras T10 is strong and reliable. The drone can be folded and unfolded effectively, which makes it more convenient to carry and easier to transport to other fields.

The main structure of the AGRAS T10 protection drone is made from carbon fiber composites, providing incredible durability while maintaining light weight. The T10 can be quickly folded and the folded dimensions are reduced by 70%, making it easy to transport. The battery and tank can be quickly connected and disconnected, which greatly improves recharging efficiency.

Quick start at the push of a button. The T10 is equipped with the RTK module as standard, which guarantees centimeter positioning accuracy. With the new DJI Agriculture app, plant protection has never been easier.

The AGRAS T10 protection drone uses a 4-nozzle design with a spray capacity of 2.4 liters per minute. Equipped with a two-channel electromagnetic flow meter, it provides a more uniform spray effect and more precise application, effectively saving liquid.
The new sphere radar system can detect obstacles in any condition, in any weather and on any plane, regardless of the degree of dust or light disturbance. The automatic obstacle avoidance function fully guarantees work safety.

The T10 is equipped with a dual FPV camera that provides a clear front and rear view so you can see what is behind the drone without the need for additional maneuvers. Meanwhile, the high-brightness headlight makes it possible to work at night.

The control module has a completely sealed structure. Thanks to the IP67 protection, the main components are perfectly protected against the entry of dangerous solids and corrosion. You don't have to worry about liquid, dust or fertilizer getting in. The folding mechanism is locked with a button and is double secured against loosening. Your work is safer and you have greater confidence in your actions.

Thanks to the use of new equipment, the stable transmission range has been increased to 5 km, thus improving resistance to interference, which in turn gives the user the ability to control two Agras at the same time. The new DJI Agriculture app makes the user interface smoother and easier to use. In addition, the smart controller is equipped with a 5.5-inch ultra-bright display, visible even in strong sunlight.
Optimize use in fertilization and fumigation
Less equipment in the field means faster and easier plan execution. The new T10 smart battery guarantees 1000 working cycles and its lifespan should be enough to cover an area of more than 4000 ha. Extremely long battery life with significantly reduced battery operating costs is a guarantee of your success.
Spreading System v3.0: Optimum Seeding

With the Agras T10 plant protection drone, the planting function can be activated within three minutes. The seeder tank has a capacity of 10 kg, with an optimal planting range of 7 m and a coverage area of approximately 28 ha per hour. The 3.0 Spreading System is equipped with eddy-resistant sensors that monitor the weight of fertilizer, seed and feed in real time. The IP67 degree of protection makes the structure resistant to corrosion and allows easy washing with a water jet. The implementation of digital agriculture solutions allows the use of variable planting, which helps reduce costs while increasing income.

With DJI's intelligent platform, you can map fruit trees and farmland to generate intelligent operational routes. The digital agriculture solution is equipped with an artificial intelligence reconnaissance system that can effectively patrol the field, identify crop growth, monitor the presence of pests and diseases, and monitor the health of agriculture. With the help of the DJI Phantom 4 Multispectral drone, along with the field application map, we will implement various fertilizations with unprecedented precision.

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Agras T16

High efficiency 24.7 acres in one hour

Dimensions

2520 × 2212 × 720 mm (arms and propellers unfolded)
1795 × 1510 × 732 mm (arms unfolded and propellers folded)
1100 × 570 × 720 mm (arms and propellers folded)

SPRAY SYSTEM - NOZZLE
Nozzle Model XR11001VS (Standard), XR110015VS (Optional, Purchase Separately)

Quantity 8

Spray speed max. SX11001VS: 3.6 l/min SX110015VS: 4.8 l/min XR11002VS: 6 l/min

Droplet Size XR11001VS: 130 - 250μm, XR110015VS: 170 - 265μm (Depending on operating environment and spray rate)

Spray width 4-6.5 m (8 nozzles, at a height of 1.5 - 3 m above the crops)

SPRINKLER SYSTEM – FLOWMETER Measuring range 0.45 - 5 L/min
Error ＜±2%

Measurable liquid Conductivity > 50 μS/cm (Liquids such as water or pesticides containing water)

Agras T20

Total weight (without battery)
21.1kg

standard takeoff weight
42.6kg

max speed of operation
7m/s

max speed Of flight
10 m/s (with a strong GNSS signal)

resistance max. to the wind 8m/s

height max. Of flight 2000m

Recommended operating temperature 0° to 40°C

AEROSTRUCTURE

SPRAY SYSTEM

Spray tank volume
Nominal: 15.1 l, Filled: 20 l

Operating load
Nominal:15.1 kg, Filled:20 kg

SPRAY SYSTEM - NOZZLE

nozzle model
SX11001VS (standard) SX110015VS (optional) XR11002VS (optional)

Quantity
8

Spray speed max.
SX11001VS: 3.6 l/min SX110015VS: 4.8 l/min XR11002VS: 6 l/min

Drop size
SX11001VS: 130-250μm SX110015VS: 170-265μm XR11002VS: 190-300μm (Related to actual working environment, spray flow, etc.)

spray width
4-7 m (8 nozzles, at a height of 1.5 - 3 m above the crops)

SPRINKLER SYSTEM - FLOWMETER

Measuring range
0.25-20l/min

Error
＜±2%

measurable liquid
Conductivity > 50 μS/cm (Liquids such as water or pesticides containing water)

HIGH PRECISION RADAR MODULE

Model
RD2428R

operating frequency
CE (Europe)/(United States): 24.00 GHz-24.25 GHz MIC (Japan)/KCC (Korea): 24.05 GHz-24.25 GHz

Dimensions
2509 × 2213 × 732 mm (Arms and propellers unfolded) 1795 × 1510 × 732 mm (Arms unfolded and propellers folded) 1100 × 570 × 732 mm (Arms and propellers folded)

Agras T30

With a maximum payload of 40kg, DJI Agras T30 reaches new heights of efficiency for aerial spraying. An innovative transforming body provides exceptional spraying, especially for fruit trees. By utilizing DJI's digital farming solutions, the T30 helps reduce fertilizer consumption and increase crop production in an efficient data-driven manner.

30 liter tank
Convertible from 4 to 6 propellers in one click
Overall IP67 water resistance
Branch detection technology for complete penetration

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16 spray nozzles provide wide coverage
with even distribution, strong penetration and exceptional drift prevention.

Eight sets of solenoid valves enable independent variable frequency control and even spray in turn. The horizontally opposed six cylinder twin plunger pump design provides high spray power and high flow rate up to 8 liters per minute.

Equipped with a large 30kg spray tank, the Agras T30 increases spray width to 9 meters and field spray efficiency to 40 acres/hour, 33.3% more than the previous generation.

- Up to 8 liters of fumigation per minute.
- Fumigation width: 9 meters.
- 5 km range.
- 5.5-inch screen and high brightness.
- Fumigation information in real time.
- Omnidirectional obstacle detector radar.
- Precise positioning RTK module.
- IP67 protection and waterproofing.
- Smart batteries with up to 1,000 charge cycles.
- Quick charge in 10 minutes.
- Virtually unlimited autonomy of operation.
- Intelligent flight operations and missions with DJI Pilot.
- Allows swarm work.

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QUESTIONS FOR IO4

1. The use of drones can help improve the economy of an average farmer

a) only for large plantations of many hectares

b) only for small farmers

c) doesn't help at all

d) it has been shown that the use of uas in agricultural work lowers costs and helps improve production

2. Drones always work the same way

a) fake. Drones can perform various jobs each flight

b) TRUE. Each drone can only be used for a very specific type of work, without variations. Never

C) a drone is designed for a specific task but can develop more functions

d) it is impossible, the law does not allow it

3. What types of drone is best for precision agriculture?

a) monocopters and policopters
b) multirotor and fixed wing
c) submarine version of dji
d) none of them

4. Whats is the largest drone company today in all around the world ?

a.)Nokia
b.) Parrot
c.) dji
d.) Yuneec

5. What type of sensor is the most demanded today in precision agriculture?

a) RGB
b) LIDAD
c) CMYK
d) MULTIESPECTRAL

6. What are some of the advantages of precision agriculture with drones?

a) speed of results

b) ability to repeat a flight plan many times

c) Cost reduction in data collection

d) all of them

7. One of the advantages of using UAVs instead of satellite images

a) On-demand photographs at key moments for a given crop only once

b) increase truck launches

c) allows a comprehensive crop damage assessment to be carried out

d) are only available for very specific small crop fields

8. more uav models to choose from..

a) It allows increasing competition, increasing variety and being able to choose the ones that best suit the farmer's needs.

b) have to invest in many types of UAVS if I want to get a good production

c) it's a bad idea, manufactures spend a lot of money on R&D that could lower cost for the end user

d) the most practical thing is to buy the first model that goes on sale and no more

9. it is expected that by 2030 an increase in the UAV market will grow over:

a) 12-15 % more

b) 29- 35 % more

c) 90-91 % more

d) 12, 28 % less

10. With the satellite view it is possible to make point clouds

a) yes, but with poor quiality

b) yes, in a very detailed way, also

c) only in certain types of high altitude cultivation

d) No.