



AGROWING

down-to-earth aerial multispectral-sensing



THE CHALLENGE

- **WORLD POPULATION IS INCREASING RAPIDLY**
- **FOOD PRODUCTION MUST RISE ACCORDINGLY**
- **AGRICULTURAL LOSSES DUE TO PESTS AND PLANT DISEASES ARE OVERWHELMING**
- **THE WORLD DEMANDS CLEAN TECHNOLOGIES**

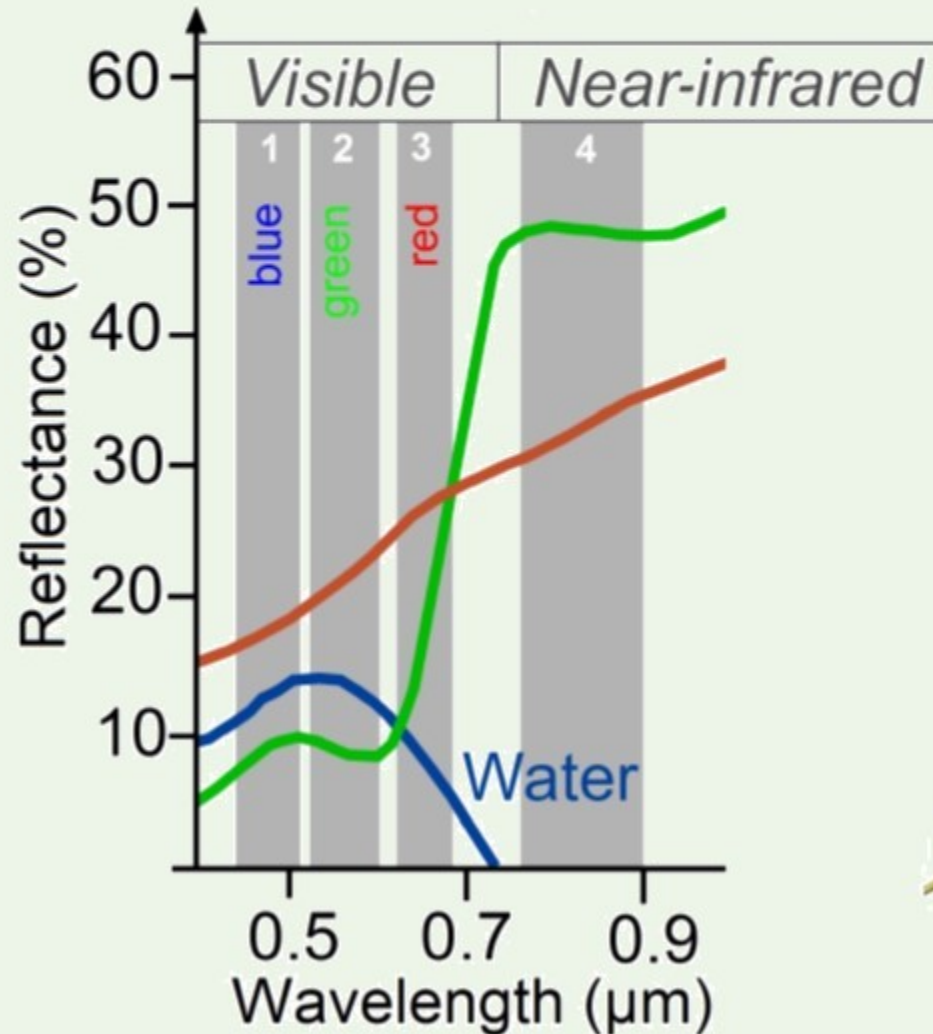


EARLY DETECTION OF PESTS, DISEASES AND VEGETATION IRREGULARITIES IS NECESSARY FOR SAVING SPRAYING AND FERTILIZING EXPENSES, MINIMIZING LOSSES AND ENHANCING CROP YIELD.

**\$40 BILLION (EQUAL TO 1/3 OF THE US
AGRICULTURE EXPORT)
LOST EVERY
YEAR DUE TO
DISEASES
AND
PESTS!**



**REFLECTED LIGHT (VISIBLE AND INVISIBLE TO THE HUMAN EYE)
CAN PROVIDE ACTIONABLE DATA ABOUT THE VEGETATION'S HEALTH/STRESS**





MULTISPECTRAL ANALYSIS OF NARROW BANDS OF THE VEGETATION'S REFLECTED LIGHT CAN PROVIDE GROWERS WITH **ACTIONABLE DATA:**

IDENTIFYING PESTS, DISEASES AND WEEDS.

MANAGING FERTILIZING AND IRRIGATION.

OPTIMIZING SPRAYS USAGE.

INCREASING CROP'S YIELD.

PROVIDING DATA ON SOIL FERTILITY AND NUTRIENT DEFICIENCIES.

COUNTING PLANTS


CALCULATING CANOPY AND SPACING.

ESTIMATING CROP YIELD.

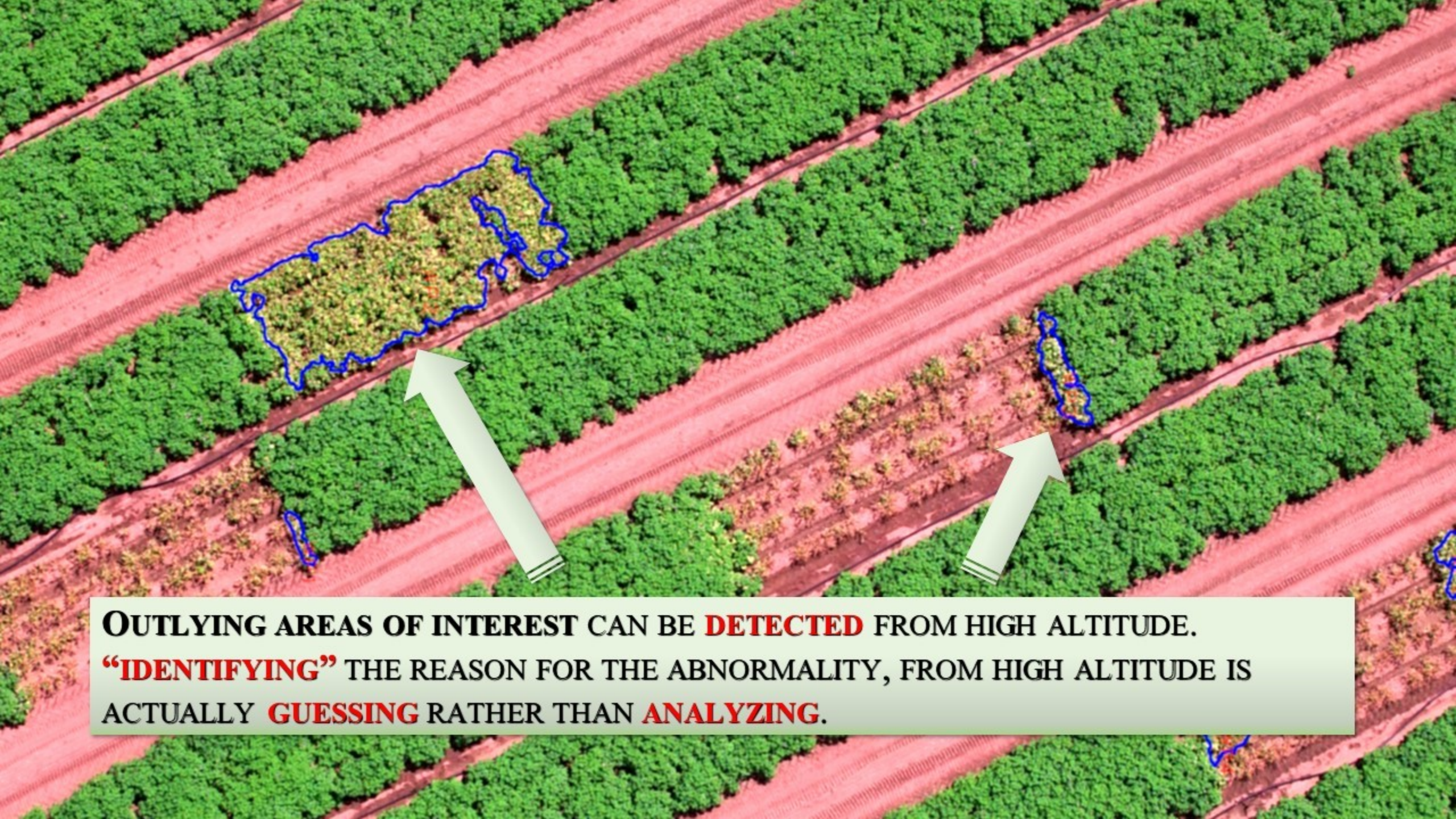


**HIGH-ALTITUDE REMOTE-SENSING CAN PROVIDE ONLY
A VAGUE IDEA OF THE VEGETATION'S HEALTH**

100M 1.7CM PER PIXEL



NDVI STANDARD NASA PALETTE



OUTLYING AREAS OF INTEREST CAN BE DETECTED FROM HIGH ALTITUDE.
“IDENTIFYING” THE REASON FOR THE ABNORMALITY, FROM HIGH ALTITUDE IS
ACTUALLY GUESSING RATHER THAN ANALYZING.

CLOSE-RANGE HIGH-RESOLUTION MULTISPECTRAL IMAGERY MUST BE ACQUIRED, IF WE WANT TO PROVIDE GROWERS WITH **ACCURATE ANALYSIS** AND **ACTIONABLE DATA**.





PESTS

DISEASES

STRESS

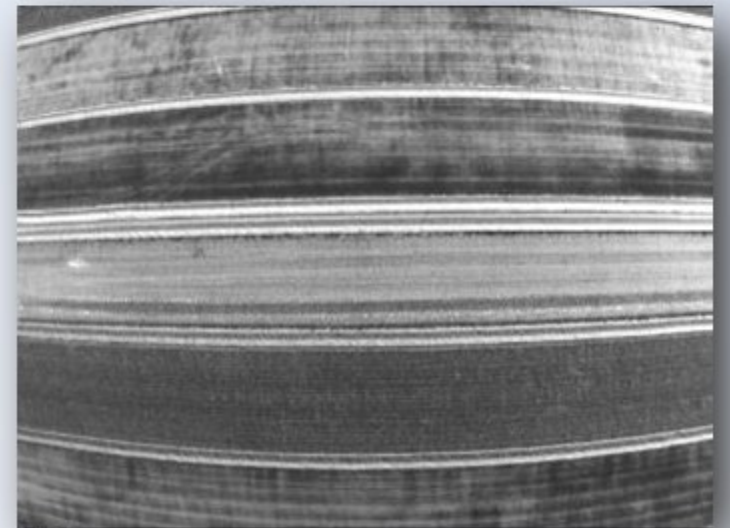
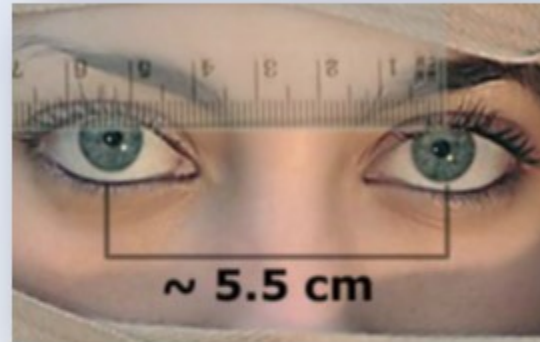
MACHINE-VISION DETECTION AND IDENTIFICATION OF ANY KIND OF VEGETATION ABNORMALITY, IS **FEASIBLE ONLY THROUGH MULTISPECTRAL ANALYSIS.**

AVOIDING MISSES AND FALSE DETECTION DICTATE EFFICIENT **SEPARATION OF IRREGULARITIES' SYMPTOMS** FROM THE **LEAVES GREEN** AND **BROWN SOIL**, IS **POSSIBLE ONLY THROUGH MULTISPECTRAL TECHNIQUES.**

POTATO BLIGHT, MUST BE SEPARATED FROM **LEAVES' GREEN** AND **SOIL'S BROWN**,
FOR MACHINE-VISION **DETECTION** AND **IDENTIFICATION**.



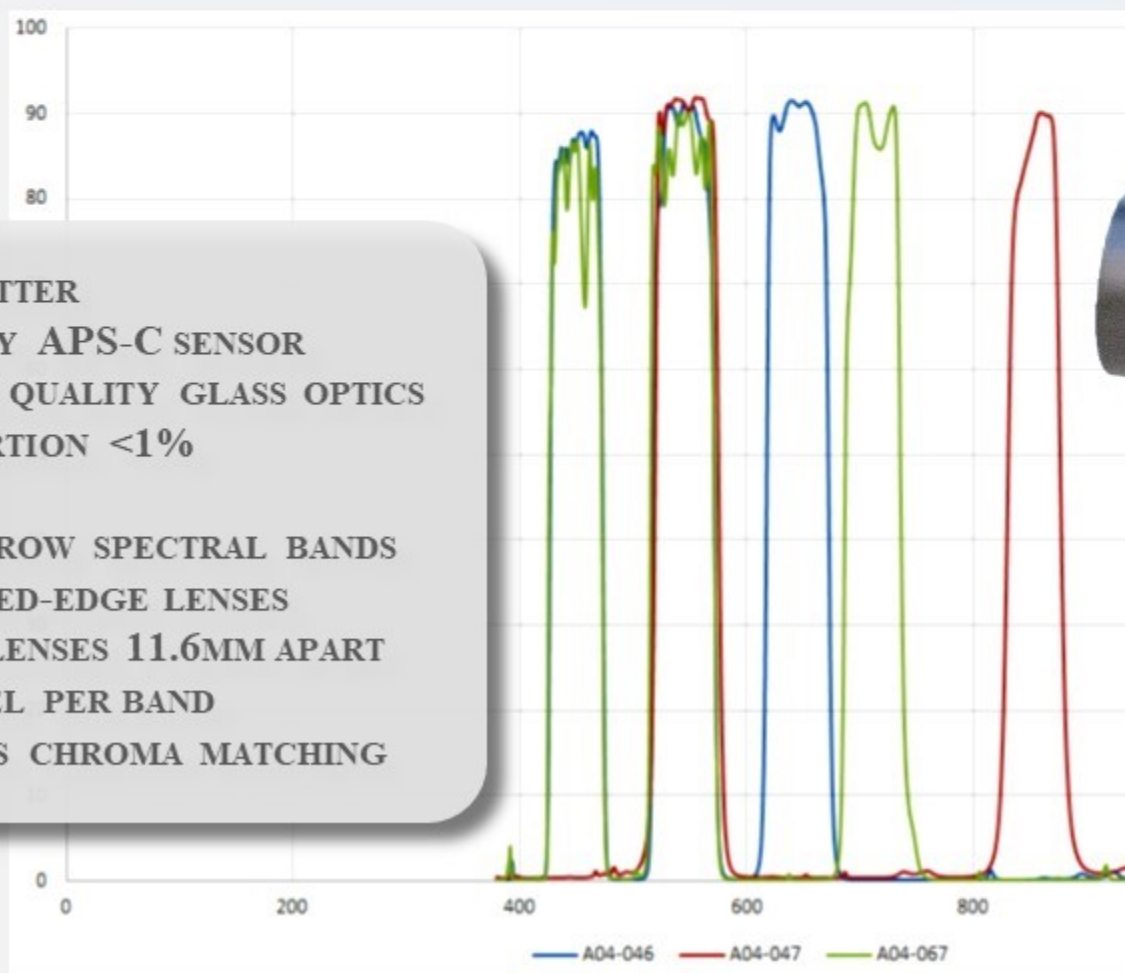
THE STATE-OF-THE-ART MULTISPECTRAL SENSORS ARE OF LOW RESOLUTION AND ARE INCAPABLE OF ACQUIRING IMAGERY AT CLOSE RANGE.



THEY ALSO SUFFER OF CHROMA ABERRATION; INACCURATE CHROMA ALIGNMENT; PARALLAX; PERIODICAL HW CALIBRATION; POOR DYNAMIC RANGE; LOW RESOLUTION; DISTORTION; OPTICS QUALITY; AND HIGH COST.

AGROWING'S PATENT PENDING SENSOR-DESIGN SOLVES ALL KNOWN MULTISPECTRAL IMAGERY ACQUISITION ISSUES, WHILE ENABLING REMOTE AND CLOSE SENSING!

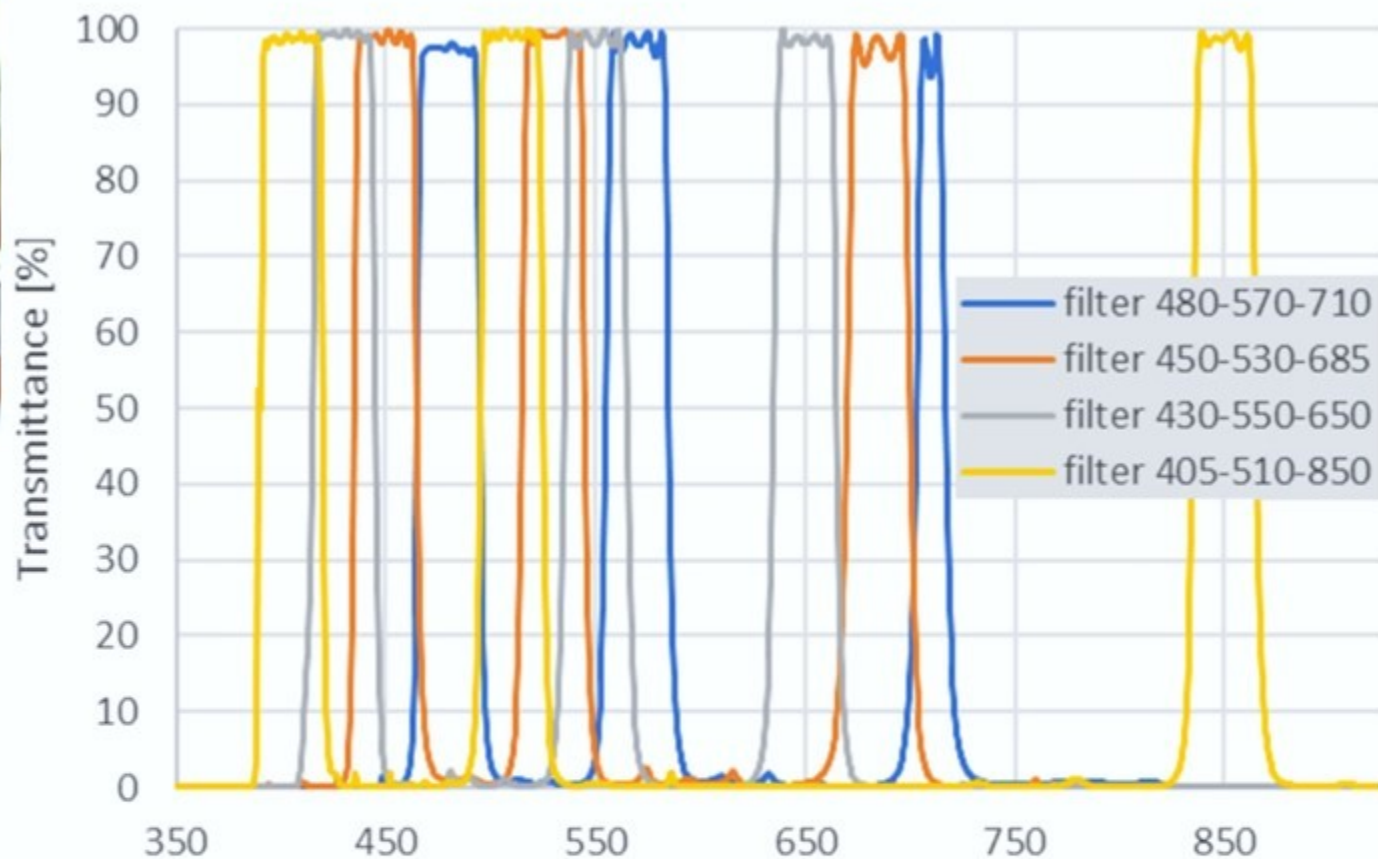
- SINGLE SHUTTER
- TOP QUALITY APS-C SENSOR
- 25MM HIGH QUALITY GLASS OPTICS
- LOW DISTORTION <1%
- FIXED F6
- 40NM 5 NARROW SPECTRAL BANDS
- NDVI AND RED-EDGE LENSES
- ADJACENT LENSES 11.6MM APART
- 8 MEGAPIXEL PER BAND
- CONTINUOUS CHROMA MATCHING



FIRST GENERATION



SECOND GENERATION



SIMILAR TO VEN μ S'ES BANDS

WE PUSHED OUR UNIQUE DESIGN EVEN FURTHER, COMPLETING AN AFFORDABLE GAME-CHANGING **12 BAND SENSOR** OF 8.5 MEGAPIXELS EACH.

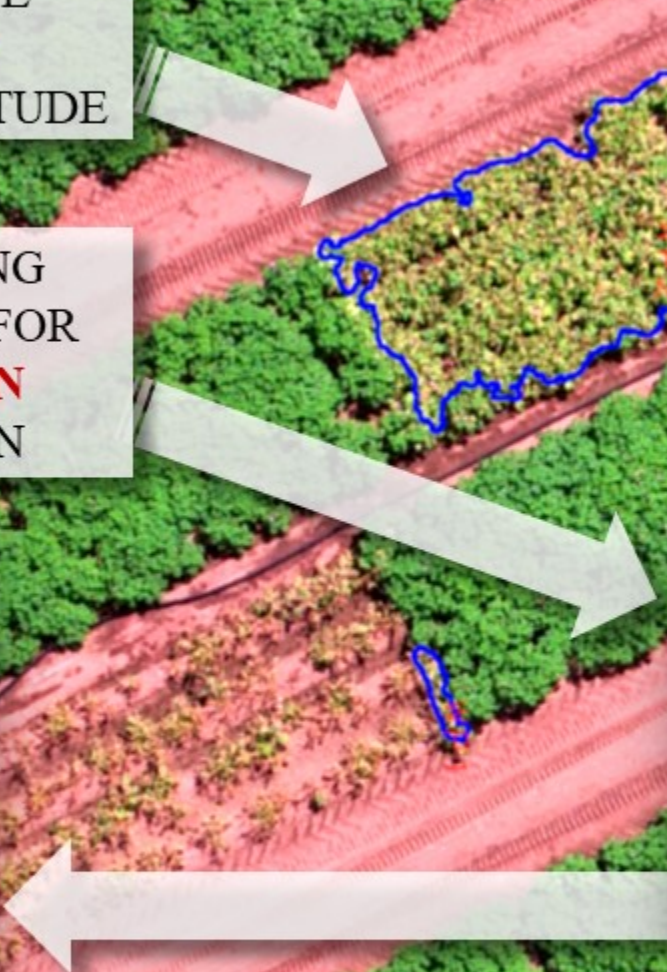
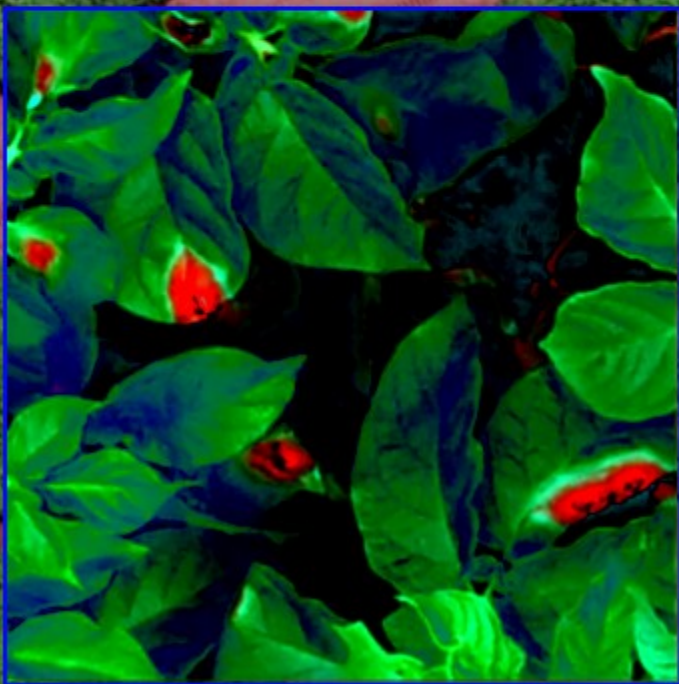
AGROWING'S ADVANTAGES IN A NUTSHELL

- **UNIQUE SENSOR DESIGN, ENABLING HIGH-RESOLUTION REMOTE & CLOSE MULTISPECTRAL SENSING, UP TO 0.375MM PER PIXEL.**
- **UNIQUE METHOD ENABLING UNSAMPLED SCANNING OF THE ENTIRE FIELD.**
- **THE WORLD'S FIRST HIGH-RESOLUTION MULTISPECTRAL IMAGERY BANK OF PESTS, DISEASES AND VEGETATION IRREGULARITIES.**



AGROWING'S SENSORS ENABLE ACCURATE **STRESSED AREAS DETECTION** FROM HIGH ALTITUDE

THEY ALSO ENABLE CAPTURING 0.375MM PER PIXEL IMAGERY FOR **REFFICIENT MACHINE-VISION DETECTION** & IDENTIFICATION



THE **DYNAMIC RANGE** OF **AGROWING'S SENSORS** ENABLES DETECTION OF **NUTRIENT DEFICIENCIES** AND **FUNGI** AND **BACTERIA PROGRESSION** IN VEGETATION.





SAMPLED SCAN BEARS A **RISK OF MISSING HAZARDS**, WHICH COULD SPREAD FAST FROM ANY POINT IN THE FIELD.

AGRICULTURAL AERIAL SURVEYS PRESENT A DILEMMA:

IF THE RESOLUTION IS ADEQUATE, THE DATA SETS ARE TOO LARGE TO HANDLE.

IF THE DATA SETS ARE SMALL ENOUGH TO HANDLE, THE IDENTIFICATION OF THE CAUSE OF ABNORMALITY IS LIMITED.



1.7CM PER PIXEL

20 GB



1MM PER PIXEL

2,560 GB!!!

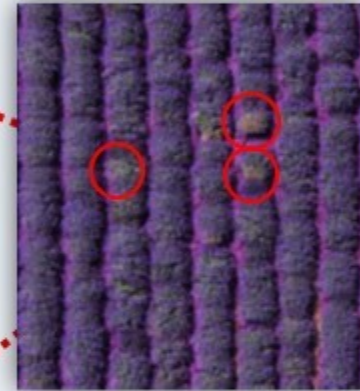
HIGH ALTITUDE UAV SCANS A FIELD,
DETECTING IN RT AREAS WHICH
CALL FOR CLOSE INSPECTION

SMALL FIELDS SYSTEM

AGROWING'S VISION NEAR REAL-TIME AUTONOMOUS DETECTION & IDENTIFICATION SYSTEM



THE SAME UAV SCANS SPECIFIC
SPOTS IN THE FIELD FROM LOW
ALTITUDE DETECTING
PESTS/DISEASES ETC.



DRONE SPRAYS SELECTIVELY
WHERE REQUIRED



HIGH ALTITUDE UAV SCANS LARGE
FIELDS, DETECTING IN REAL-TIME AREAS
WHICH CALL FOR CLOSE INSPECTION

LARGE FIELDS SYSTEM

AGROWING'S VISION

REAL-TIME AUTONOMOUS
DETECTION & IDENTIFICATION SCALABLE SYSTEM



DRONE SPRAYS SELECTIVELY
WHERE REQUIRED

MULTIPLE LOW ALTITUDE UAVS
SCAN SPECIFIC SPOTS, DETECTING
PESTS/DISEASES/IRREGULARITIES

AGROWING'S PATENT PENDING METHOD SOLVES THE DATA VOLUME DILEMMA!

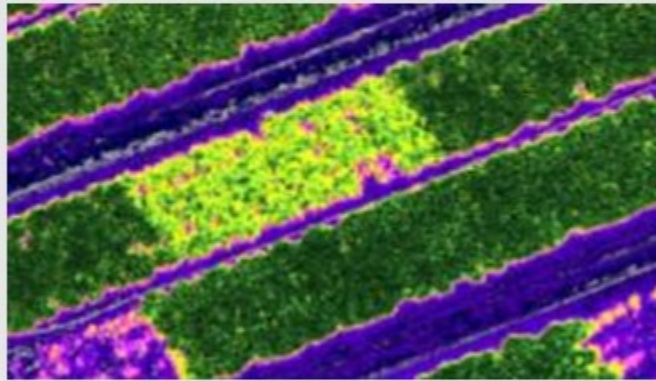
SCAN THE ENTIRE FIELD FOR AREAS OF INTEREST FROM HIGH ALTITUDE

ACQUIRE HIGH RESOLUTION MULTISPECTRAL IMAGERY ONLY WHERE NECESSARY!

ACQUIRE HIGH RESOLUTION
MULTISPECTRAL IMAGERY FROM
100-120M.



DETECT AUTOMATICALLY OUTLYING
AREAS OF INTEREST (STRESS ETC.).



2 DETECT

COLLECT HIGH RESOLUTION DATA
FROM 3M-15M ,ANALYZE AND SEND
GROWER THE FINDINGS.



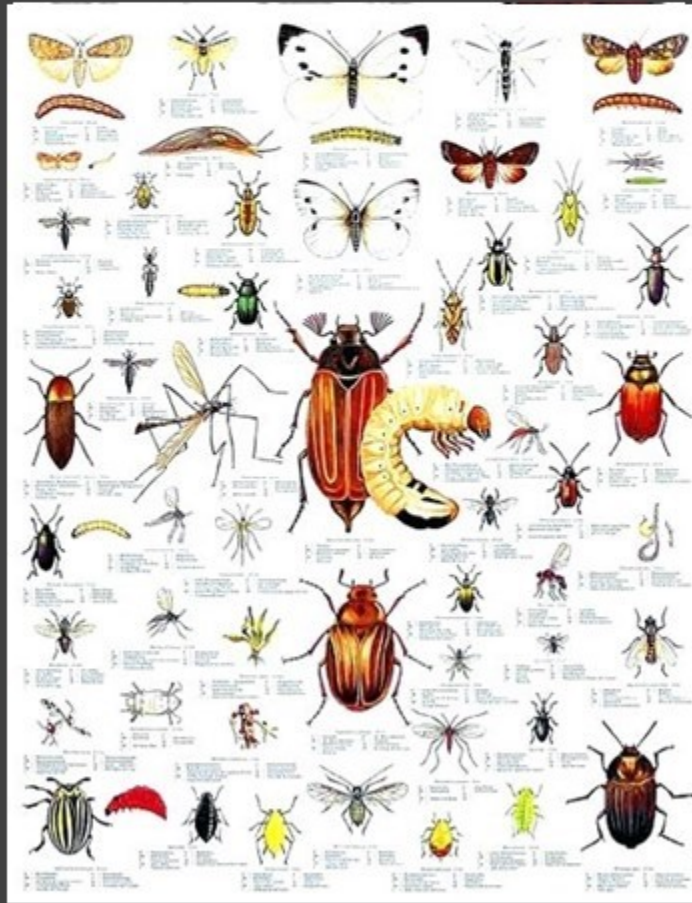
3 ANALYZE

AGROWING HAS STARTED COLLECTING IMAGERY, BASED ON ITS UNIQUE IP FOR THE WORLD'S FIRST **HIGH RESOLUTION** MULTISPECTRAL **BIG DATA BANK**.

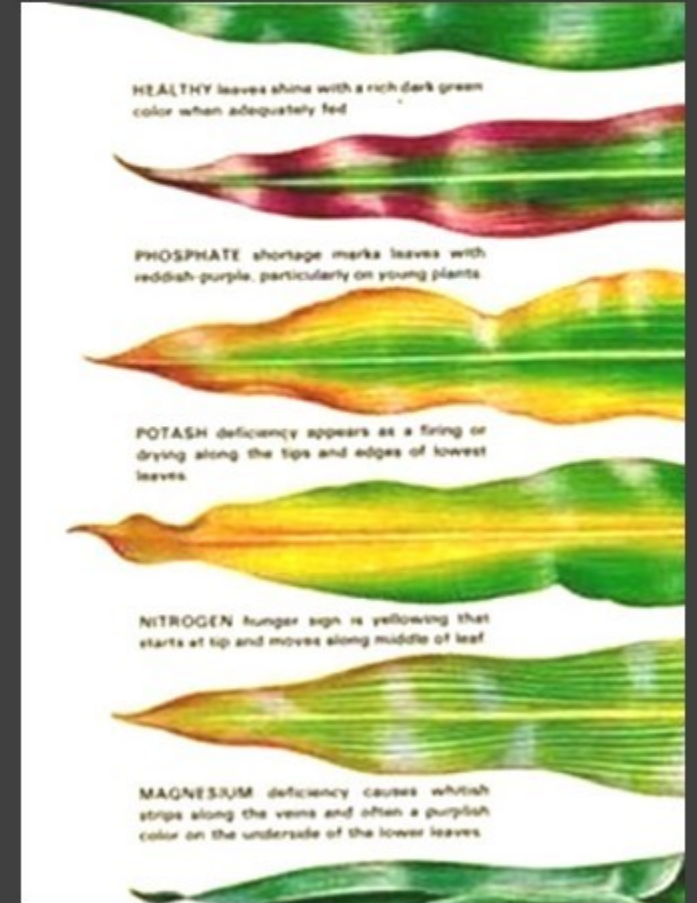
STRESS



PESTS



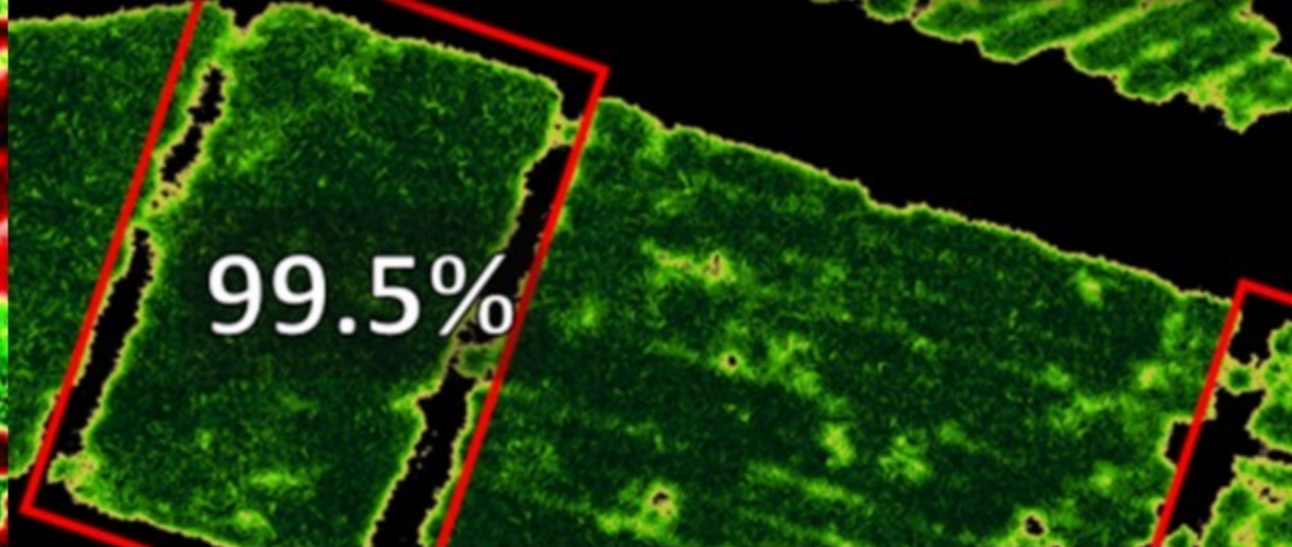
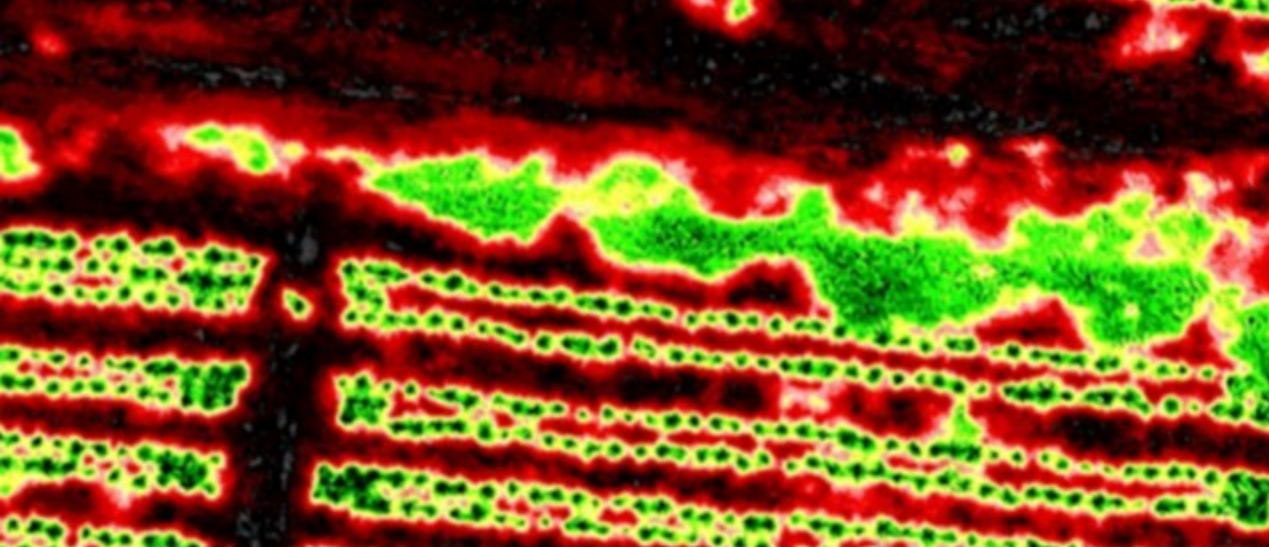
IRREGULARITIES



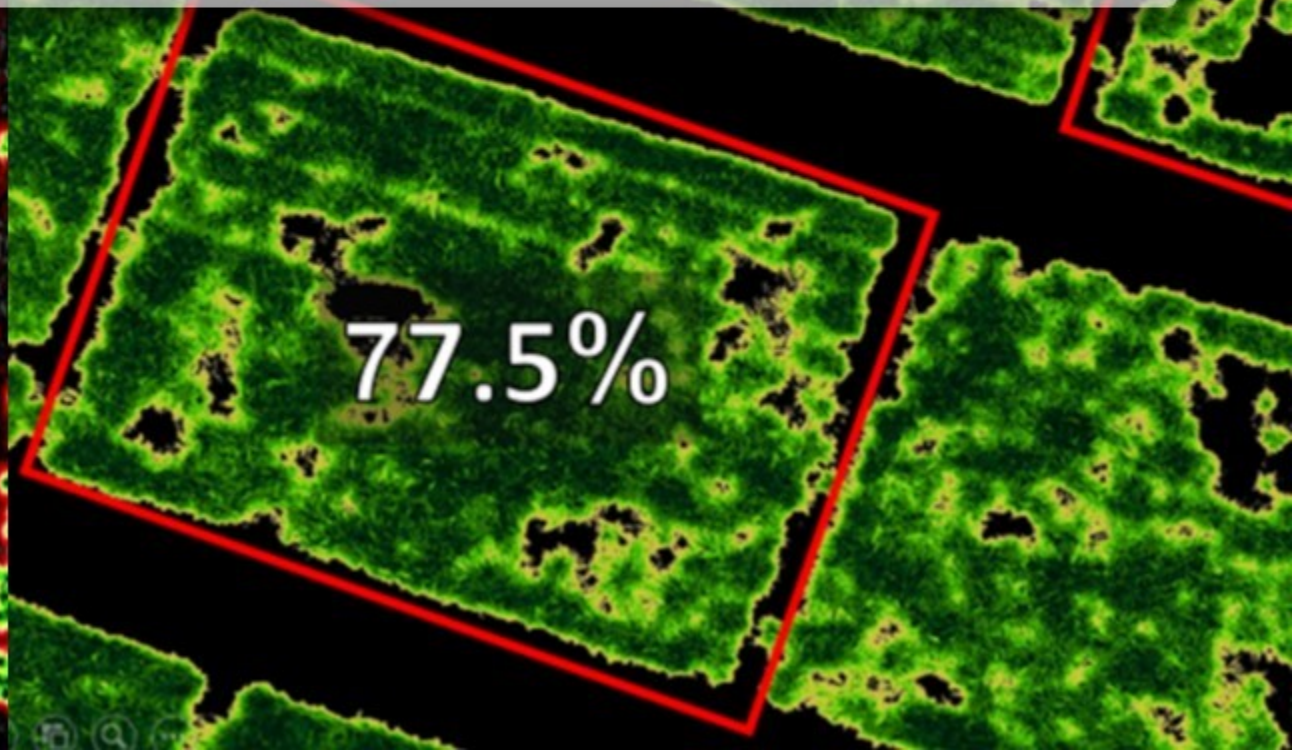
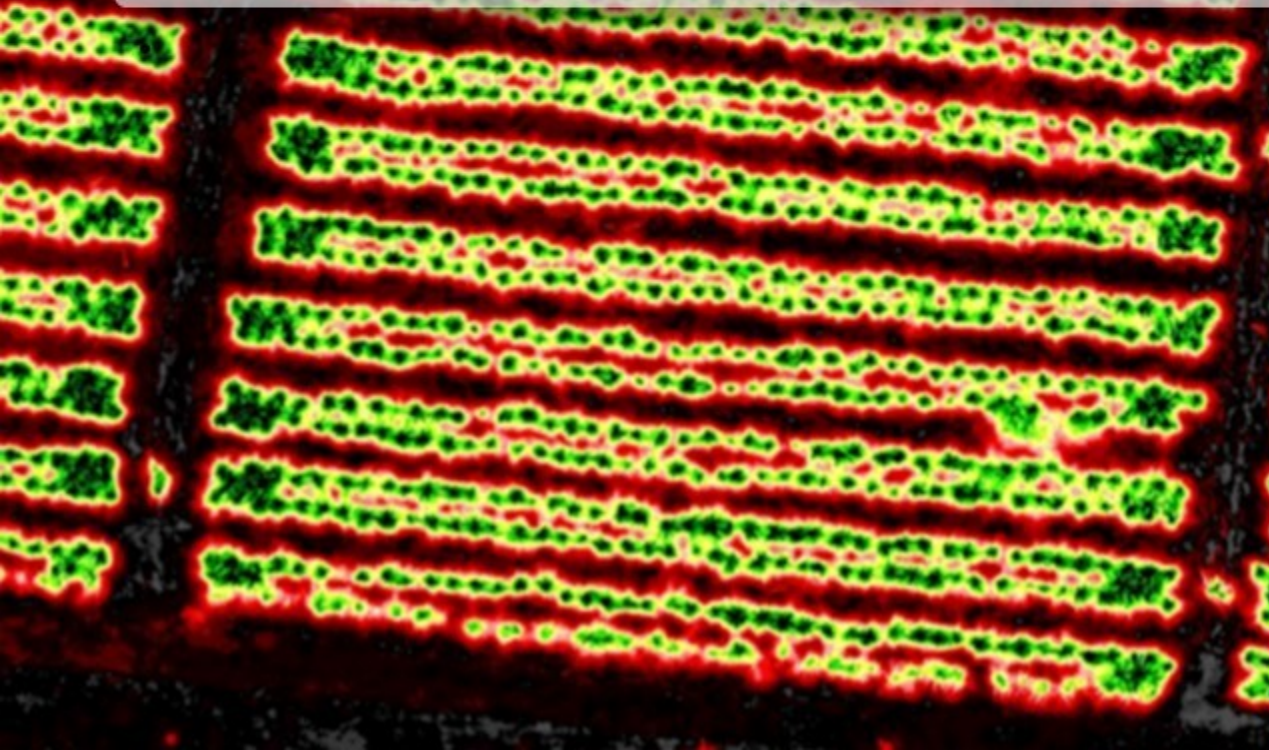


AGROWING HAS ALREADY DEVELOPED MACHINE-VISION ALGORITHMS FOR THE IDENTIFICATION OF POTATO BLIGHT, ALTERNARIA AND COLORADO BEETLE, USING DEEP LEARNING TECHNIQUES BASED ON ITS INITIAL IMAGERY BANK DATA. WE ALSO PROVED THE ABILITY TO SPOT HLB, BLACK SIGATOKA PROGRESSION, COTTON WHITE FLY AND MORE.





WE ALSO PROVED THE EFFICIENCY OF OUR MULTISPECTRAL ANALYSIS TO CALCULATE PINEAPPLES PLOTS' CANOPY AND COUNT PINEAPPLE PLANTS.



AGROWING'S TWO PENDING PATENTS PASSED PCT SEARCH AND OPINION WITH PERFECT SUCCESS!

A METHOD FOR AERIAL IMAGING ACQUISITION AND ANALYSIS

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

International application No.
PCT/IL2016/051205

Statement

| | | |
|-------------------------------|------------|-----|
| Novelty (N) | Ciams 1-26 | YES |
| | Ciams 1-26 | NO |
| Inventive step (IS) | Ciams 1-26 | YES |
| | Ciams 1-26 | NO |
| Industrial applicability (IA) | Ciams 1-26 | YES |
| | Ciams 1-26 | NO |

MULTISPECTRAL IMAGING APPARATUS

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

International application No.
PCT/IL2016/050628

Statement

| | | |
|-------------------------------|------------|-----|
| Novelty (N) | Ciams 1-26 | YES |
| | Ciams 1-26 | NO |
| Inventive step (IS) | Ciams 1-26 | YES |
| | Ciams 1-26 | NO |
| Industrial applicability (IA) | Ciams 1-26 | YES |
| | Ciams 1-26 | NO |

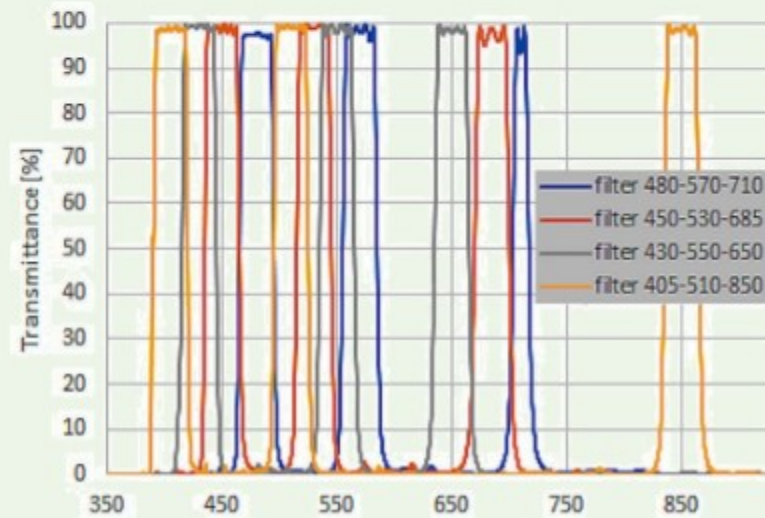
NEAR-FUTURE PLANS

- **COMPLETING** IN-THE-FIELD/IN THE AIR REAL-TIME STITCHING AND DETECTION OF AREAS OF INTEREST.
- **ENRICHING** OUR MULTISPECTRAL IMAGERY BANK AND OFFER WIDE RANGE OF MACHINE-VISION SOLUTIONS TO ADDITIONAL CROPS.
- **PRODUCING** AUTO-FOCUS LENSES FOR GREENHOUSES (CANNABIS AND OTHER VALUABLE CROPS).



2019-2020 ROADMAP – ENHANCING AGROWING'S ADVANTAGES

- 12 NARROW SPECTRAL BANDS
- 16 MP PER BAND
- LIGHT WEIGHT
- AUTO-FOCUS FOR GREENHOUSES



WE PARTNER WITH THE BEST TO COLLECT MULTISPECTRAL IMAGERY FOR OUR BANK AND OFFER CUSTOMERS IN-THE-FIELD TURNKEY AERIAL SURVEYS SOLUTIONS.

1 Sensor

8MP, 10MP and 12MP sensors

NDVI and Red Edge interchangeable lenses.



2 Drone

We collaborate with Xfold, BlueBird, Event 38, Airace and others, offering integrated agricultural drones, flying 25 minutes to 180 minutes.

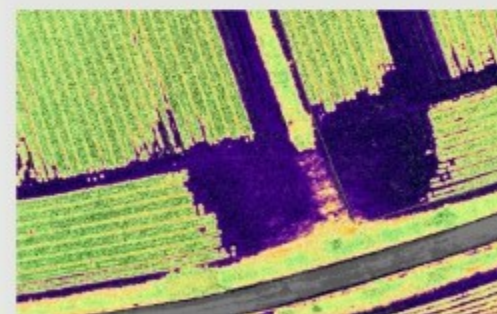


3 Software

Icaros' One Button proven technology completes the package.

In Field orthophoto stitching and over a dozen agricultural metrics.

Adds-On include automatic areas of interest detection.





AGROWING

www.agrowing.com



THANK YOU!