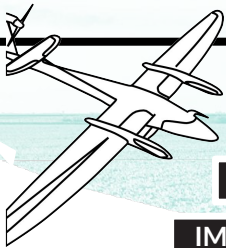


Hummingbird
Technologies



**Lettuce Counting &
Sizing 2020**

Lettuce counting & Sizing



Lettuces detected (counted), and accurately measured (sized)

IMAGING PLATFORM: UAV RGB IMAGE, GSD: 1 cm. Merged crops are unsuitable.

>95% accuracy



PURPOSE

Monitor lettuces numbers and sizes of all varieties across multiple fields & territories.

HOW IT WORKS

Using state-of-the-art AI and high-resolution drone imagery. With the Hummingbird tool, each and every lettuce in a field is detected, and accurately measured.

Working Varieties: Iceberg, Romaine, Little Gem, Apollo.

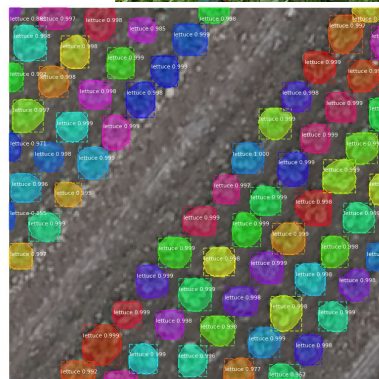
Open Crop: >95% accuracy (Iceberg & Roman).

Fleeced Crop: 90-95% accuracy

BENEFITS & VALUE

Accurate capture of lettuce data throughout the season to

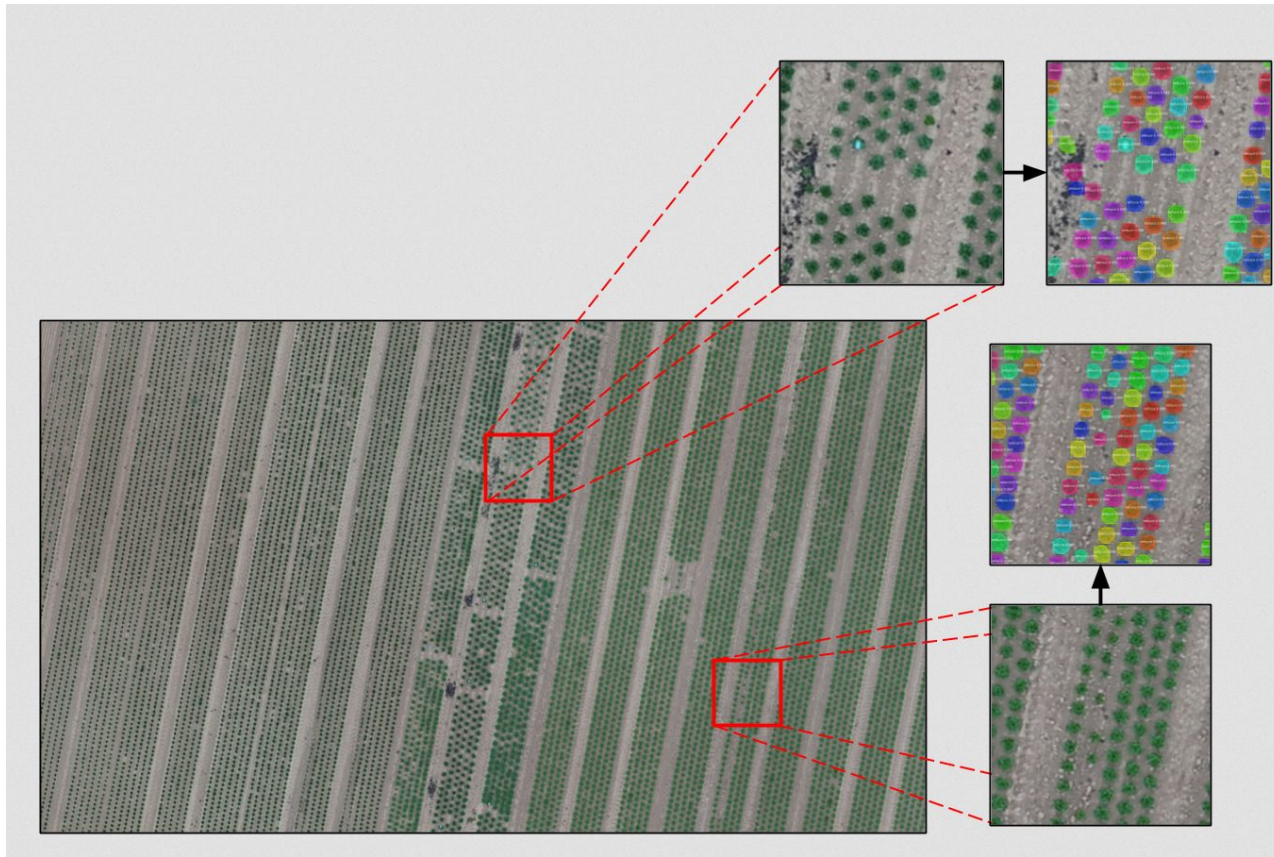
- Inform planting / fleecing / harvesting schedules.
- Precise farming enablement by identification of lower growth areas.
- Reduction in herbicides & pesticides inputs + costs.
- Sustainable farm management.
- Limit waste.
- Sizing information can be used to allow the farmer to homogenise / segment the crop per plot.





Hummingbird AI Solution

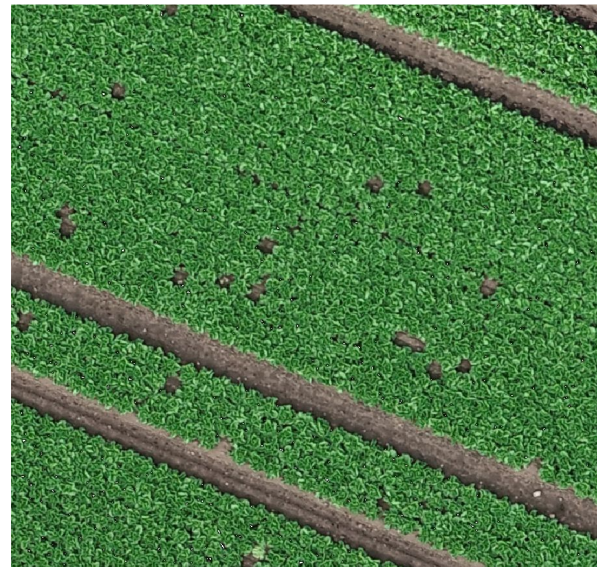
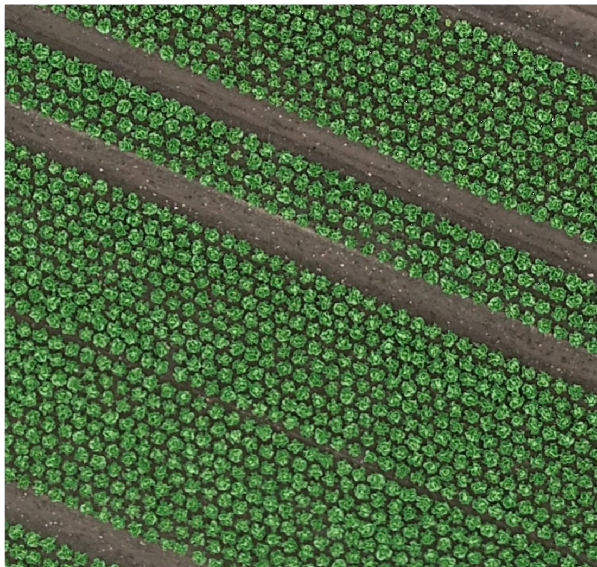
- Using state-of-the-art AI and high-resolution drone imagery, Hummingbird Technologies has achieved analytics at an unprecedented scale
 - Data collection
 - Train algorithm
 - Knowledge share
 - Comparison with plant counts per plot

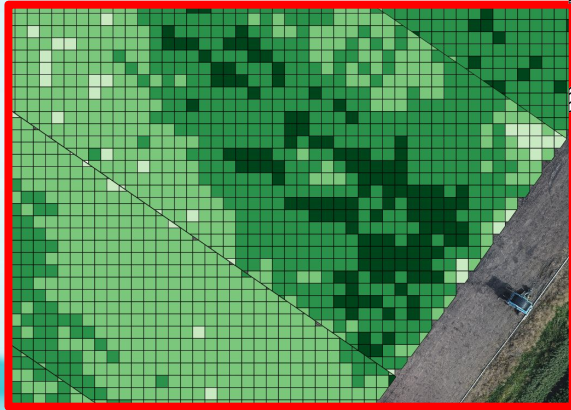




Requirements

- 1cm GSD
- RGB is the imagery analysed
- Merged crops are unsuitable
- Minimum plant size requirement of 8cm diameter
- Timed to fly crop at 30% crop growth cycle (variable depending on planting period)
 - Feb fly c40 days post planting,
 - May fly c15 days post planting

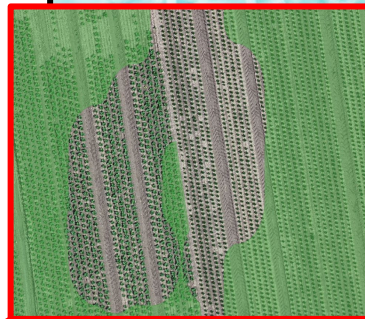
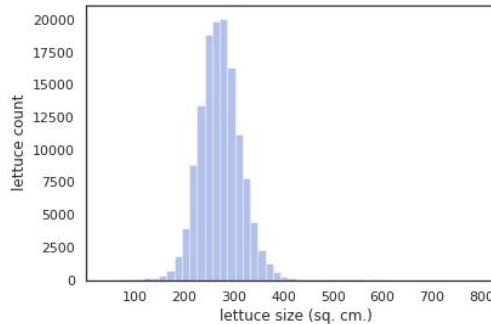




Delivered Analytics

- Count values per plot.
- A spreadsheet with various stats (mean size, standard deviation, distribution).
- Distribution chart for each variety.
- Shapefile with gridded mean size (2x2m cells) for each variety.
- Shapefile with gridded variance (custom-size cells, depending on the client) for each variety.
- Spot-spray map based on client sizing tolerances.

	A	B
1	Survey name:	P37
2	Number of plants detected:	132743
3	Survey resolution (cm):	0.992
4	Average plant size (sq. cm.):	271.69
5	Standard deviation plant size (sq. cm.):	41.41
6	Plant size for the average 50% (sq. cm.):	270.06
7	Plant size for 25% smallest (sq. cm.):	221.73
8	Plant size for 25% largest (sq. cm.):	324.92
9		
10	Distribution of sizes	
11	41 to 57:	1
12	57 to 72:	1
13	72 to 87:	7
14	87 to 103:	11
15	103 to 118:	55
16	118 to 133:	101
17	133 to 149:	162
18	149 to 164:	289
19	164 to 179:	698
20	179 to 195:	1790
21	195 to 210:	3968
22	210 to 226:	8810
23	226 to 241:	13482
24	241 to 256:	18887
25	256 to 272:	19850
26	272 to 287:	20109
27	287 to 302:	16319
28	302 to 318:	11159
29	318 to 333:	7774
30	333 to 348:	4429
31	348 to 364:	2343
32	364 to 379:	1304
33	379 to 394:	604
34	394 to 410:	261
35	410 to 425:	116
36	425 to 440:	56
37	440 to 456:	48
38	456 to 471:	26
39	471 to 487:	21
40	487 to 502:	21
41	502 to 517:	7
42	517 to 533:	6
43	533 to 548:	7
44	548 to 563:	4
45	563 to 579:	1
46	579 to 594:	6
47	594 to 609:	3
48	609 to 625:	0



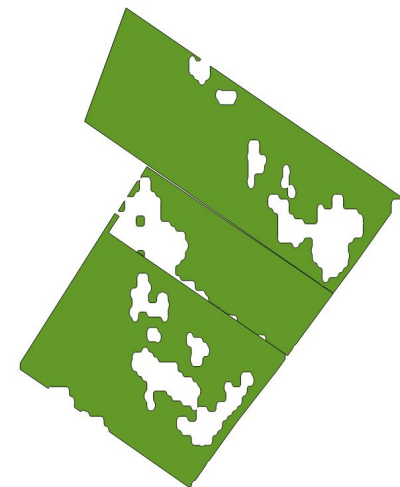
Spot spray Nitrogen map:
Green colour corresponds to the Nitrogen spray being applied.



2020 Product Development

Working with growers to refine our solution to their needs

- Add more/other lettuce varieties.
- Other types of maps to fit in with farm machinery tolerances.
 - Changing grid sizes to 5x5m.
 - Zones rather than individual mean size per cell.
 - Change detection map between different survey dates to track performance through season.
- Use of RTK drone data to reduce manual manipulation of plot boundaries increasing / accuracy speed of delivery.
- Data outputs on the platform.





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GET IN TOUCH

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