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*Dry bean herbicides and cover crops

*Site-specific herbicide applications in corn

Rationale for dry bean cover crop by herbicide comparison

- Dry bean acres are very susceptible to wind erosion in the spring and fall.
- Short term cover crops offer many benefits
  - Winter rye might be the best option for erosion management, but intended dry bean acres are not always known in the fall, when rye is typically planted
  - Short term cover crops are used in other systems, such as sugar beets, to manage wind
  - Spring seeded cover crops allow more flexibility in cropping system with little risk to dry bean yields

Study

- In 2021 and 2022 studies were established at the CREC
  - Oats, barley, and spring-seeded winter rye were utilized
  - 6 PPI or PRE herbicides were used with each cover crop
    - All herbicides were incorporated mechanically
    - Dry beans were planted within a day of herbicide applications
  - Cover crops terminated at early POST herbicide timing with Select
  - No dry bean yield data in 2021 due to drought, but yield was collected in 2022.

2021 results

Cover Crop	Herbicide	Cereal Stand	Phytotoxicity	Green Foxtail Control
		pl/a	%	%
Oats	Check	809352	0.0	3.8
Oats	Sonalan	671747	26.3	52.5
Oats	Treflan	843690	3.8	20.0
Oats	Dual II	888079	1.3	25.0
Oats	Outlook	798995	5.0	25.0
Oats	Prowl H2O	767923	11.3	55.0
Oats	Spartan Elite	722054	0.0	18.8
Barley	Check	915885	0.0	50.0
Barley	Sonalan	844863	3.8	90.0
Barley	Treflan	852261	0.0	61.3
Barley	Dual II	899609	2.5	63.8
Barley	Outlook	764963	5.0	65.0
Barley	Prowl H2O	775321	0.0	55.0
Barley	Spartan Elite	837465	0.0	53.8
Rye	Check	726493	0.0	3.8
Rye	Sonalan	630318	15.0	75.0
Rye	Treflan	793076	0.0	11.3
Rye	Dual II	847822	10.0	10.0
Rye	Outlook	821189	5.0	18.8
Rye	Prowl H2O	781239	6.3	55.0
Rye	Spartan Elite	856700	8.8	17.5
LSD (0.05)		145990	8.3	14.0

2022 results

Cover Crop	Herbicide	Cereal Stand	Stand	Yield
		Plant/a	%	lb/a
Oats	Check	726493	0.0	2208
Oats	Sonalan (2pt)	482356	57.5	2193
Oats	Sonalan (3pt)	464601	63.8	2502
Oats	Dual II	517867	32.5	2489
Oats	Outlook	449804	50.0	2391
Oats	Prowl H2O	469039	50.0	2546
Oats	Spartan Elite	639196	17.5	2328
Barley	Check	733891	0.0	2208
Barley	Sonalan (2pt)	591848	36.3	2261
Barley	Sonalan (3pt)	599246	30.0	2383
Barley	Dual II	643635	28.8	2314
Barley	Outlook	611083	37.5	2291
Barley	Prowl H2O	674707	10.0	2229
Barley	Spartan Elite	588889	20.0	2270
Rye	Check	656951	2.5	2041
Rye	Sonalan (2pt)	408375	53.8	2461
Rye	Sonalan (3pt)	551898	47.5	2317
Rye	Dual II	412814	66.3	2777
Rye	Outlook	466080	56.3	2629
Rye	Prowl H2O	588889	22.5	2311
Rye	Spartan Elite	511948	56.3	2543
LSD (0.05)		248096	16.7	370

Summary

- Cover crop + PRE herbicide worked together to reduce weed pressure in some cases
- Barley was most effective at reducing weed populations and was the most tolerant to the herbicides used.
- Sonalan was the most injurious product to the cover crops
- There was no dry bean yield penalty to this strategy in 2022

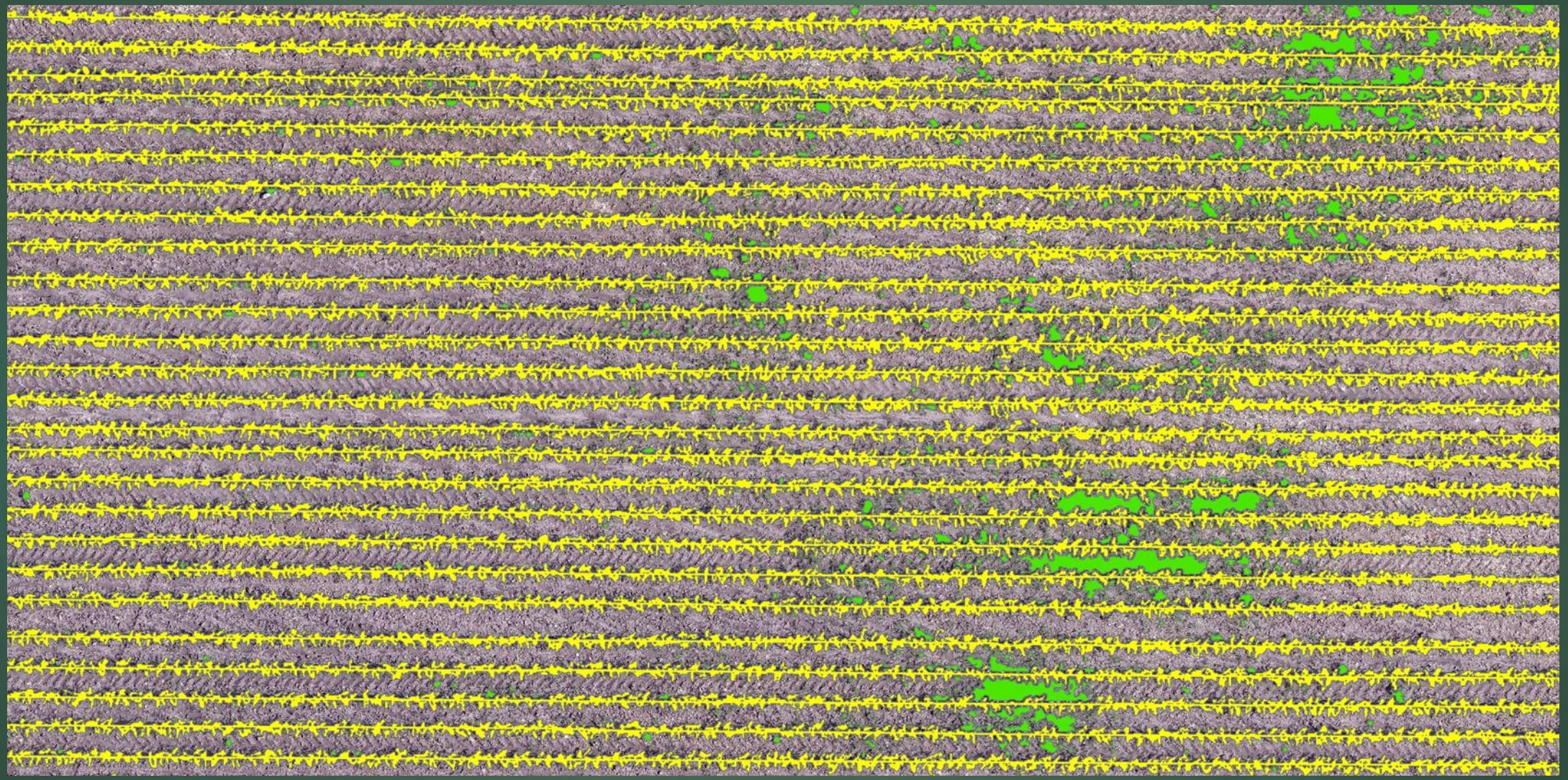
- Most products could be applied POST to the cover crop but PRE to the dry beans (except Spartan Elite, and Sonalan)

Site-specific weed control in corn
*An NDSU Precision Agriculture collaboration

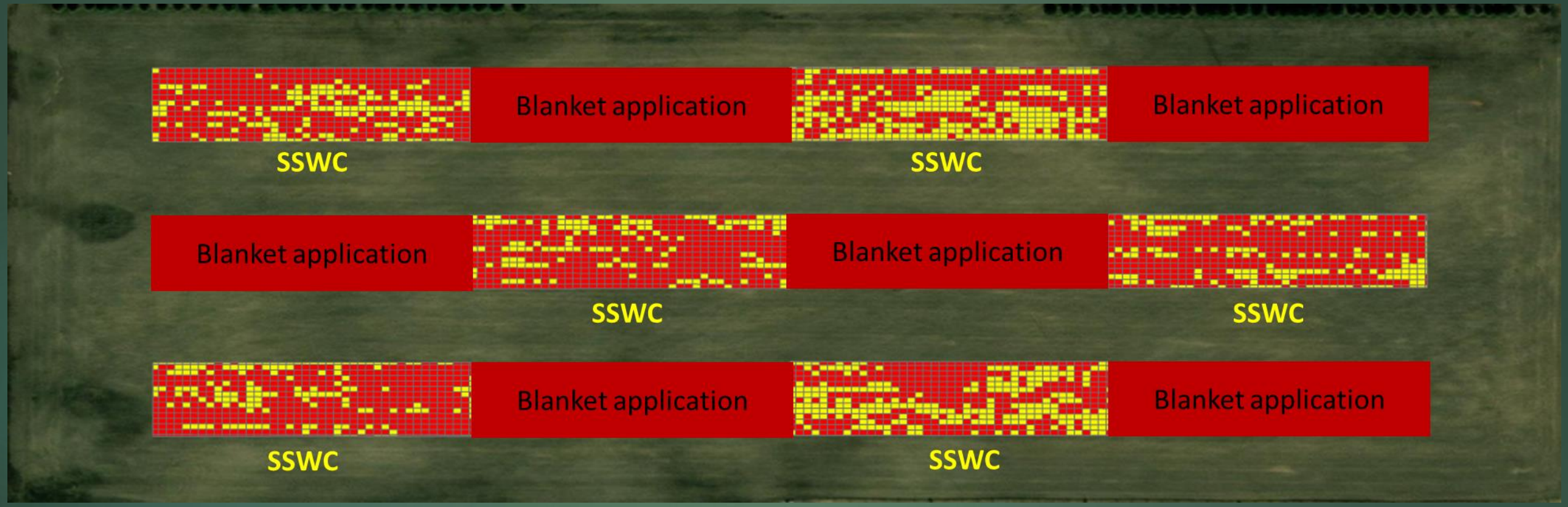
Concept

- If your sprayer can use individual nozzle control, how can we make it spray only what we need – with today's technology?
  - Start with an effective PRE program – blanket application, reduce POST weed pressure
  - Map corn rows, identify areas that have weeds early post-emergence
  - Create grid map of individual nozzles, to spray only weed patches
  - Execute prescription map with POST herbicide of choice

Corn row and weed mapping

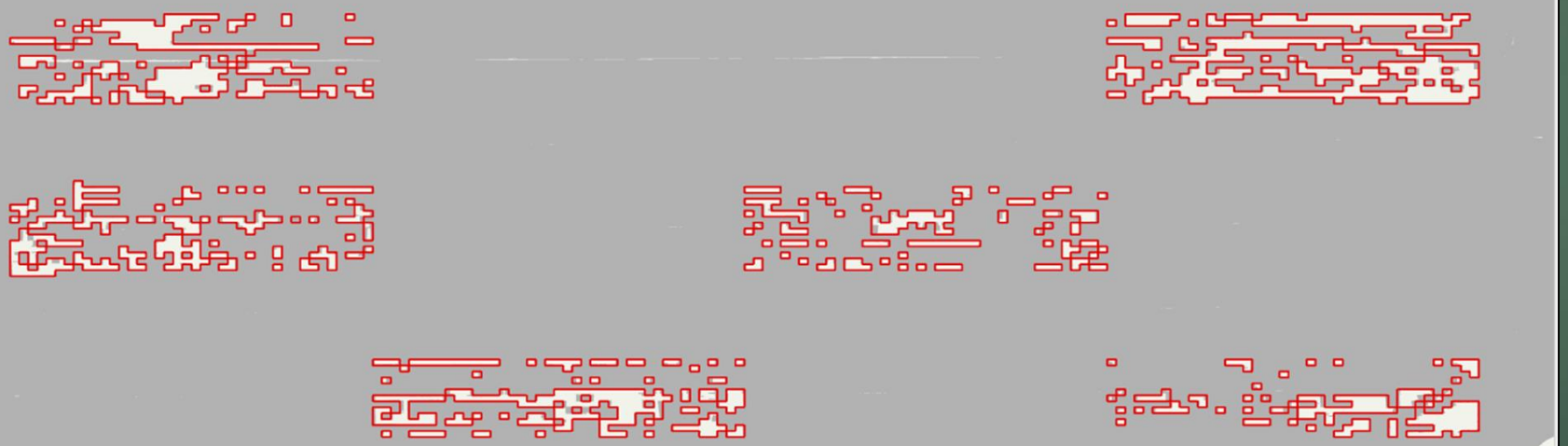


Research design

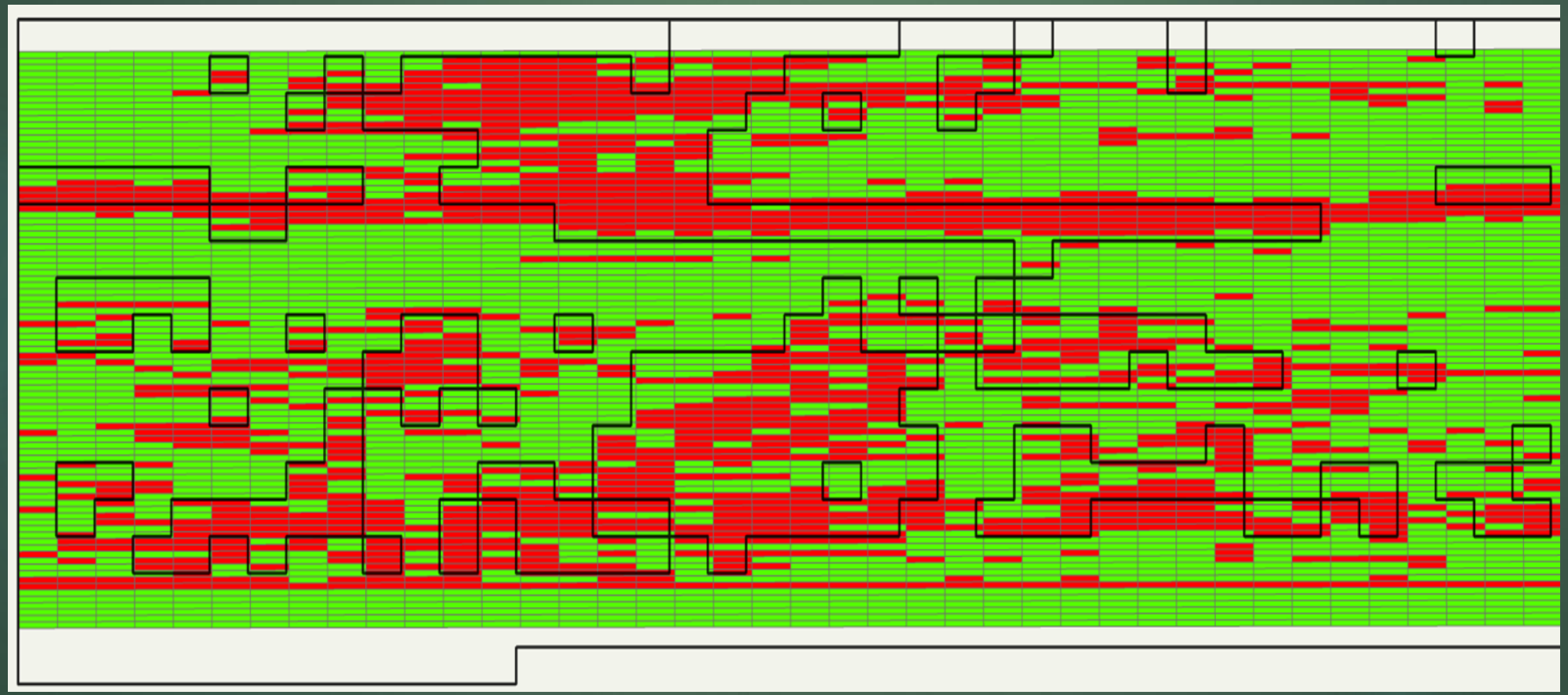


SSWC

- Plot size = 400 ft x 136.6 ft (boom width)
- Cell size = 5 ft wide x 10 ft long



“As applied map”



Summary

- Disadvantages:
  - SSWC is not easily implemented yet – several steps had to be custom designed (not a commercially available service)
    - This barrier is being reduced soon
  - Requires a drone flight prior to spraying

- Advantages include:
  - 25-70% savings on herbicide application over the course of 3 years
  - No end-of-season difference weed control detected between SSWC and blanket application
  - Compared to active sensors (See and Spray) this strategy allows you to know how much product you need

Thank you!