Table S1. Product specification comparisons between the P4P, P4R, and P4M.

Items		UAV Specification		
		P4P	P4R	P4M
Weight (g), including battery and propellers		1375	1391	1487
Max flight time (minutes)		~30	~30	~27
Vertical hover accuracy range		±0.5 m (with DGPS)	±0.1 m (with RTK)	± 0.1 m (with RTK)
Horizontal hover accuracy range		±1.5 m (with DGPS)	±0.1 m (with RTK)	± 0.1 m (with RTK)
Battery		LiPo 2S	LiPo 2S	LiPo 2S
Operation ground station		DJI GS PRO	DJI GS RTK	DJI GS PRO
Camera:	Sensor	1-inch CMOS	1-inch CMOS	Six 1/2.9 inch CMOS
	Effective pixels	20 Mega	20 Mega	2.08 Mega
	Focal length (mm)	8.8	8.8	5.74
	FOV of lens	84°	84°	62.7°
	Image size (pixel)	5472×3648	5472×3648	1600×1300
	Photography format	JPEG	JPEG	JPEG + TIFF

Table S2. Details on the UAV-based images.

Flight Date	Flight Altitude (m)	The Total Number of Images			The Number of Images Filtered			Weather	Calibrated Ground Resolution (mm/pixel)		
		P4P	P4R	P4M /Band count	P4P	P4R	P4M /Band count		P4P	P4R	P4M
07/16/2020	25	174	330	1720 / 5	174	315	700 / 2	Sunny	0.7	6.96	1.33
08/08/2020	25	265	351	1332 / 2	265	346	1332 / 2	Sunny	7.31	6.94	1.33
08/23/2020	25	230	351	1326 / 2	230	346	1326 / 2	Sunny	6.69	6.87	1.31
09/27/2020	25	295	271	266 / 2	295	268	266 / 2	Sunny	6.46	6.74	1.3
10/25/2020	25	192	271	420 / 3	192	270	280 / 3	Sunny	6.97	6.89	1.34

Table S3. Details on the photogrammetry configuration.

Item		Processed Image	
		P4P-Base Images	P4R-Based Images
Image quality estimation		NO	YES
Alignment:	Accuracy	HIGH	HIGH
	Pre-alignment	Generic preselection	Generic preselection
	Reference preselection mode	Estimation	Estimation
	Key point limit	40000	40000
	Tie point limit	4000	4000
Camera Calibration		Auto-calibration Parameters: cx, cy, k1-k3	Pre-calibration Parameters: b1, b2, cx, cy, k1-k4, p1, p2
Reconstruction:	Quality	HIGH	HIGH
	Filtering mode	Mild	Mild

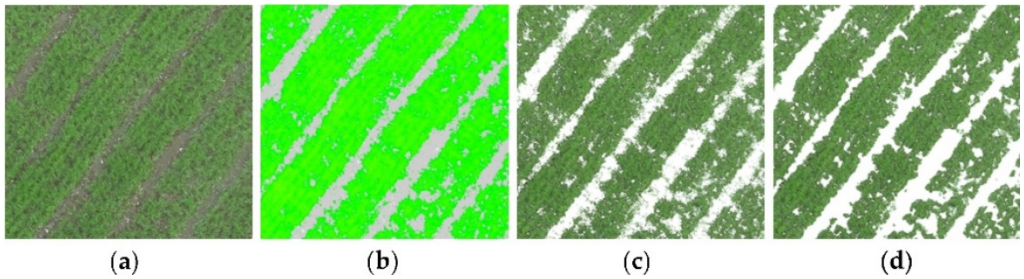


Figure S1. The workflow of the VI filter: (**a**) the original DSPC; (**b**) DSPC mapping after applying the VI filter; (**c**) the DSPC after VARI thresholding; (**d**) the $DSPC_{canopy}$ after noise removal via a Statistical Outlier Filter (SOF) tool in CloudCompare.

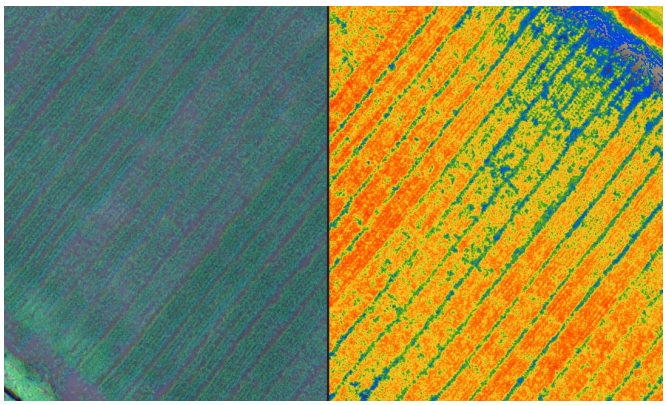


Figure S2. Orthomosaic mapping containing multispectral information (partially). The mapping consisting of five original bands of information is shown on the left, and the NDVI mapping calculated using RED and NIR bands is shown on the right.

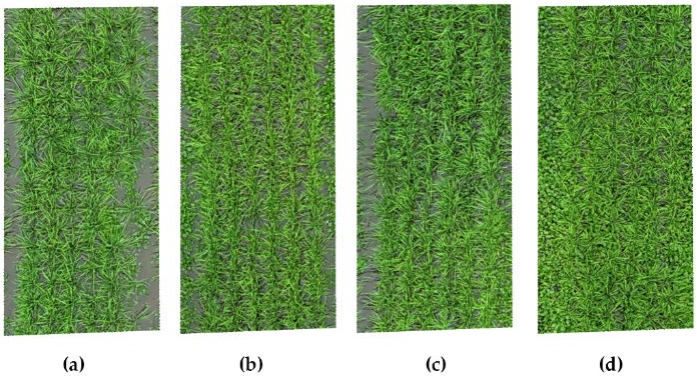


Figure S3. The specific manifestations of different treatments: (**a**) *low density without cover crop*; (**b**) *low density with cover crop*; (**c**) *high density without cover crop*; (**d**) *high density with cover crop*.