

Table S1. Weekly and monthly summation of mean air temperature, solar radiation, and total precipitation for four weeks after heading stage at the study sites.

Environ ment	Location	Year		Weekly Summation				Monthly Summation
				1	2	3	4	1
A	Sendai, Miyagi	2017	Temperature (°C)	162.2	149.7	155.2	176.2	643.3
			Precipitation (mm)	47.6	51.7	36.9	30.3	166.5
			Solar radiation (MJ m ⁻² d ⁻¹)	63175	46698	43872	112051	265796
B	Sendai, Miyagi	2018	Temperature (°C)	168.8	181.9	164.2	171.9	686.8
			Precipitation (mm)	89.9	23.9	25.7	94.7	234.2
			Solar radiation (MJ m ⁻² d ⁻¹)	94300	124262	144150	63185	425897
C	Sendai, Miyagi	2019	Temperature (°C)	179.9	181.3	168.4	167	696.6
			Precipitation (mm)	4.5	27	39.3	26.8	97.6
			Solar radiation (MJ m ⁻² d ⁻¹)	79046	98044	86156	85781	349027
D	Gero, Gifu	2020	Temperature (°C)	189.2	185.1	186.2	174.8	735.3
			Precipitation (mm)	2.6	24.2	40.5	80.7	148
			Solar radiation (MJ m ⁻² d ⁻¹)	142735	153036	120843	94164	510778
E	Kaizu, Gifu	2020	Temperature (°C)	204.86	204.86	192.84	174.65	777.21
			Precipitation (mm)	2	50.21	98.82	109.13	260.16
			Solar radiation (MJ m ⁻² d ⁻¹)	166253	127854	93404	99915	487426
F	Kaizu, Gifu	2020	Temperature (°C)	203.36	204.03	193.16	174.12	774.67
			Precipitation (mm)	11.75	34.18	109.17	74.53	229.63
			Solar radiation (MJ m ⁻² d ⁻¹)	156893	122086	93380	96762	469121
G	Yoro, Gifu	2020	Temperature (°C)	204	204.7	193.35	174	776.05
			Precipitation (mm)	14.2	29.21	93.33	62.4	199.14
			Solar radiation (MJ m ⁻² d ⁻¹)	157906	122609	93771	97028	471314

H	Kaizu, Gifu	2021	Temperature (°C)	189.6	202.7	199.7	203.7	795.7
			Precipitation (mm)	21	0.8	13.8	39.2	74.8
			Solar radiation (MJ m ⁻² d ⁻¹)	154625	169318	141496	133564	599003
I	Fukue, Gifu	2021	Temperature (°C)	172.2	177	201	168.3	718.5
			Precipitation (mm)	223.2	79.9	0	87.2	390.3
			Solar radiation (MJ m ⁻² d ⁻¹)	55696	73224	144013	82089	355022
J	Fukue, Gifu	2021	Temperature (°C)	171.9	176.8	201.3	169.3	719.3
			Precipitation (mm)	242.4	82.6	0	89.4	414.4
			Solar radiation (MJ m ⁻² d ⁻¹)	55568	72927	141562	81451	351508
K	Fukue, Gifu	2021	Temperature (°C)	170.5	176.6	199.9	168.4	715.4
			Precipitation (mm)	277.1	58	0.9	63.3	399.3
			Solar radiation (MJ m ⁻² d ⁻¹)	57145	70876	141539	83284	352844
L	Kaizu, Gifu	2022	Temperature (°C)	201.4	186.7	187.6	188.1	763.8
			Precipitation (mm)	10.8	106.7	30.3	94.2	242
			Solar radiation (MJ m ⁻² d ⁻¹)	119518	107631	102373	113040	442562
M	Kaizu, Gifu	2022	Temperature (°C)	201.4	186.7	187.6	193.7	769.4
			Precipitation (mm)	10.8	106.7	30.3	92	239.8
			Solar radiation (MJ m ⁻² d ⁻¹)	119518	107631	102373	166796	496318
N	Nankoku, Kochi	2022	Temperature (°C)	184	185.3	184.9	187.4	741.6
			Precipitation (mm)	288.5	42.8	63.9	3.6	398.8
			Solar radiation (MJ m ⁻² d ⁻¹)	106000	104769	109717	102190	422676
O	Nankoku, Kochi	2022	Temperature (°C)	199.2	200.2	200.3	198.9	798.6
			Precipitation (mm)	131.1	61.7	4.6	1	198.4
			Solar radiation (MJ m ⁻² d ⁻¹)	158620	159223	125380	131192	574415

Table S2. ANN model performance for predicting rice yields with the training, validation, and test dataset.

Model No.	Architecture	Weather	Layer	Train			Validation			Test		
				RMSE t ha ⁻¹	RMSPE %	R ²	RMSE t ha ⁻¹	RMSPE %	R ²	RMSE t ha ⁻¹	RMSPE %	R ²
19	ANN	No	0	1.366	22	0.11	1.378	24	0.12	1.392	23	0.06
20	ANN	No	1	1.212	19	0.30	1.214	20	0.31	1.226	20	0.28
21	ANN	No	2	1.135	18	0.39	1.131	18	0.40	1.160	18	0.35
22	ANN	Monthly	0	16.366	243	-155.39	15.941	240	-132.88	16.955	255	-156.14
23	ANN	Monthly	1	0.946	16	0.58	0.927	16	0.60	0.947	16	0.57
24	ANN	Monthly	2	0.946	16	0.58	0.925	16	0.60	0.953	16	0.56
25	ANN	Weekly	0	1.115	18	0.41	1.118	19	0.42	1.129	19	0.39
26	ANN	Weekly	1	0.964	16	0.56	0.942	16	0.59	0.969	16	0.55
27	ANN	Weekly	2	0.946	16	0.58	0.924	16	0.60	0.952	16	0.57

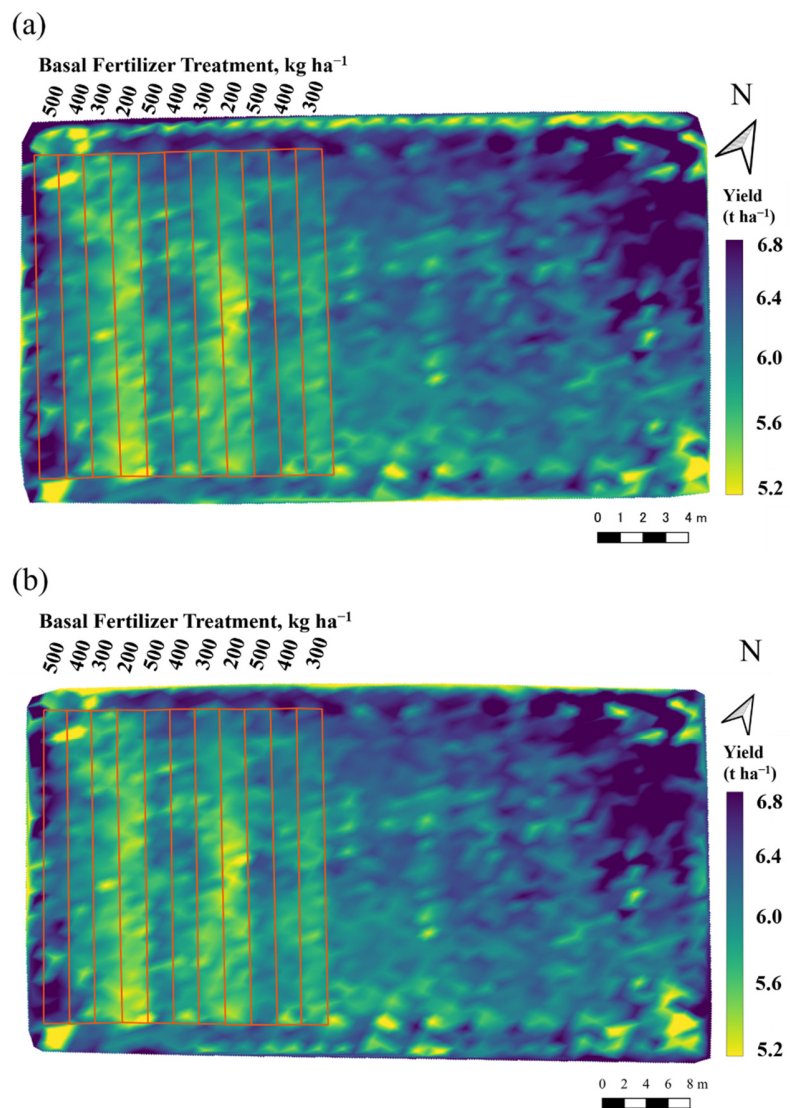


Figure S1. Yield prediction maps (using only UAV images) of a surveyed field based on (a) Model 1 and (b) Model 12.