

Supplementary materials

Table S1| Cultivation measures in the Experimental sites

Experimental sites	Planting measures	Planting specifications	Heading date
Dayi country	Machine rice planting	30cm×18cm 3-4 seedling/hill	2021.7.31-2021.8.13
Shehong city	Machine rice planting	30cm×20cm 3-4 seedling/hill	2021.8.08-2021.8.13
Nanbu country	Machine rice planting	30cm×16cm 3-4 seedling/hill	2021.8.01-2021.8.08
Chongzhou city	Machine rice planting	30cm×20cm 3-4 seedling/hill	2021.8.07-2021.8.11

Table S2| Weight ratio of fertilizer formulations

Treatment	Urea(%)	Potassium chloride (%)	HA(%)	PASP(%)	GABA(%)
P-White	42.6	40.8	/	0.3	/
G-White	42.6	40.8	/	/	0.3
P-Black	42.6	40.8	4	0.3	/
G-Black	42.6	40.8	4	/	0.3

Table S3| Identification results of the independent data set of Jingyou 781 with different fertilizer treatments

	P-White	G-White	P-Black	G-Black	Common spike fertilizer	CK
Manual count	324	330	379	395	389	411
Model count	378	374	408	499	422	348
Statistical accuracy (%)	83.33	86.67	92.35	73.67	91.52	84.67



Figure S1|UAV acquisition of raw images



Figure S2 | Example of a boxed area

Table S4 | The result from previous studies on rice panicle detection

Author	mAP (%)	F1-Score	Recall (%)	Model	Detection speed (ms)	Couting accuracy(%)
Zhang et al., (2021)	80.3	/	stage	Faster-RCNN with Inception	169	/
Zhou et al.(2019)	86.8	0.874	88.3	Improved R-FCN	489	/
Hayat et al. (2020)	/	0.9028	89.77	Bayesian Segmentation	/	/
Xu et al., (2020b)	/	/	/	MHW-PD	/	87%
Ours method	90.32	0.89	82.36	YOLOV4-MobileNetV2-CBAM	22.5	85.37%