



Figure S1. Aerial image of maize seedlings at Zhangye Experimental Station in 2022.



Figure S2. The measurement system removes the influence of weeds outside the row through the detection of maize rows.

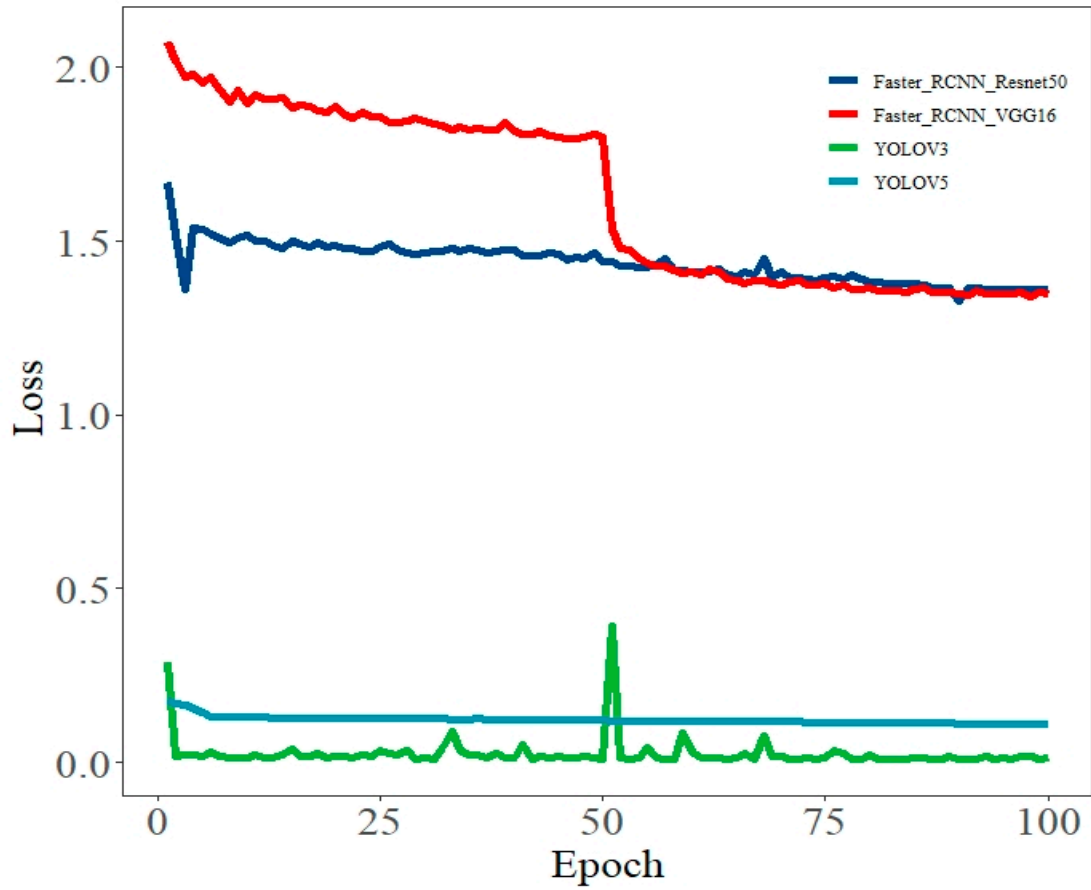


Figure S3. Performance comparison of four algorithms (Faster\_RCNN\_Resnet50, Faster\_RCNN\_VGG16, YOLO\_v3 and YOLO\_v5) in maize seedling prediction.

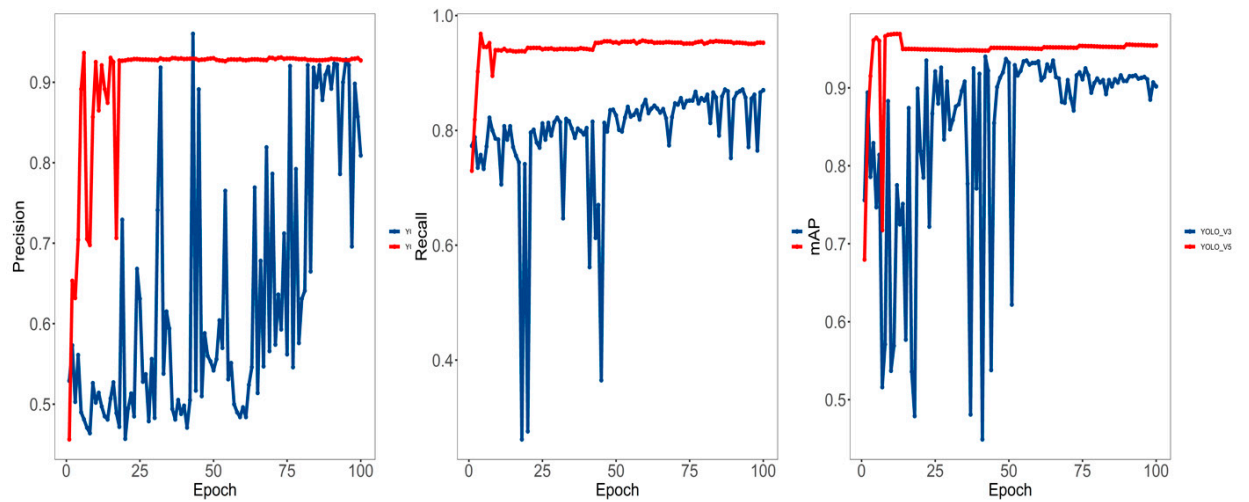


Figure S4. Model performance comparison of different models (YOLO\_v3 and YOLO\_v5).

Table S2. Comparison of accuracy between YOLO\_v3 and YOLO\_v5 in the prediction of seedling count of maize.

Parameter	Year	Site	yolov3	yolov5
R2	2021	Gongzhuling	0.9937	0.9817
	2021	Zhangye	0.9641	0.9407
	2021	Zhuozhou	0.9984	0.9593
	2022	Gongzhuling	0.8897	0.9473
	2022	Zhangye	0.9358	0.9118
	2022	Zhuozhou	0.9753	0.9444
Accuracy	2021	Gongzhuling	92.0004	84.2625
	2021	Zhangye	83.9272	72.9246
	2021	Zhuozhou	96.9930	77.7648
	2022	Gongzhuling	77.7558	72.3836
	2022	Zhangye	43.9647	41.0039
	2022	Zhuozhou	88.9972	82.5250
RMSE	2021	Gongzhuling	28.8163	51.1894
	2021	Zhangye	32.5048	98.2650
	2021	Zhuozhou	11.4990	96.4146
	2022	Gongzhuling	120.1892	106.6600
	2022	Zhangye	214.0237	216.6334
	2022	Zhuozhou	68.5236	86.1634
ME	2021	Gongzhuling	1.1391	2.0234
	2021	Zhangye	1.8767	5.6733
	2021	Zhuozhou	0.7824	6.5602
	2022	Gongzhuling	3.7707	4.0228
	2022	Zhangye	12.3567	12.9928
	2022	Zhuozhou	2.5258	4.0174
MAE	2021	Gongzhuling	1.1453	2.1984
	2021	Zhangye	3.2033	6.0933
	2021	Zhuozhou	0.8843	6.5694
	2022	Gongzhuling	3.8140	4.0939
	2022	Zhangye	12.3567	12.9928
	2022	Zhuozhou	2.5747	4.0261