Supplementary materials

Table S1 Performance comparison of traditional and deep learning models for vigor classification in naturally aged rice seeds (Precision, Recall, F1-score).

Variety	Range	Model	Non-vigorous			Vigorous		
			Precision	Recall	F1-score	Precision	Recall	F1-score
HH31	VNIR	PLS-DA	78.35	58.02	66.67	51.33	73.42	60.42
		SVM	90.32	42.75	58.03	49.32	92.41	64.32
		CNN	86.32	62.60	72.57	57.39	83.54	68.04
		CFNet	80.99	87.79	84.25	76.47	65.82	70.75
	SWIR	PLS-DA	85.00	77.86	81.27	67.78	77.22	72.19
		SVM	89.32	70.23	78.63	63.55	86.08	73.12
		CNN	87.41	90.08	88.72	82.67	78.48	80.52
		CFNet	91.79	93.89	92.83	89.47	86.08	87.74
MXZ2	VNIR	PLS-DA	81.94	93.38	87.29	83.64	62.16	71.32
		SVM	90.40	83.09	86.59	72.94	83.78	77.99
		CNN	91.30	77.21	83.67	67.37	86.49	75.74
		CFNet	90.37	89.71	90.04	81.33	82.43	81.88
	SWIR	PLS-DA	68.82	86.03	76.47	52.50	28.38	36.84
		SVM	81.42	67.65	73.90	54.64	71.62	61.99
		CNN	80.30	77.94	79.10	61.54	64.86	63.16
		CFNet	80.92	77.94	79.40	62.03	66.22	64.05

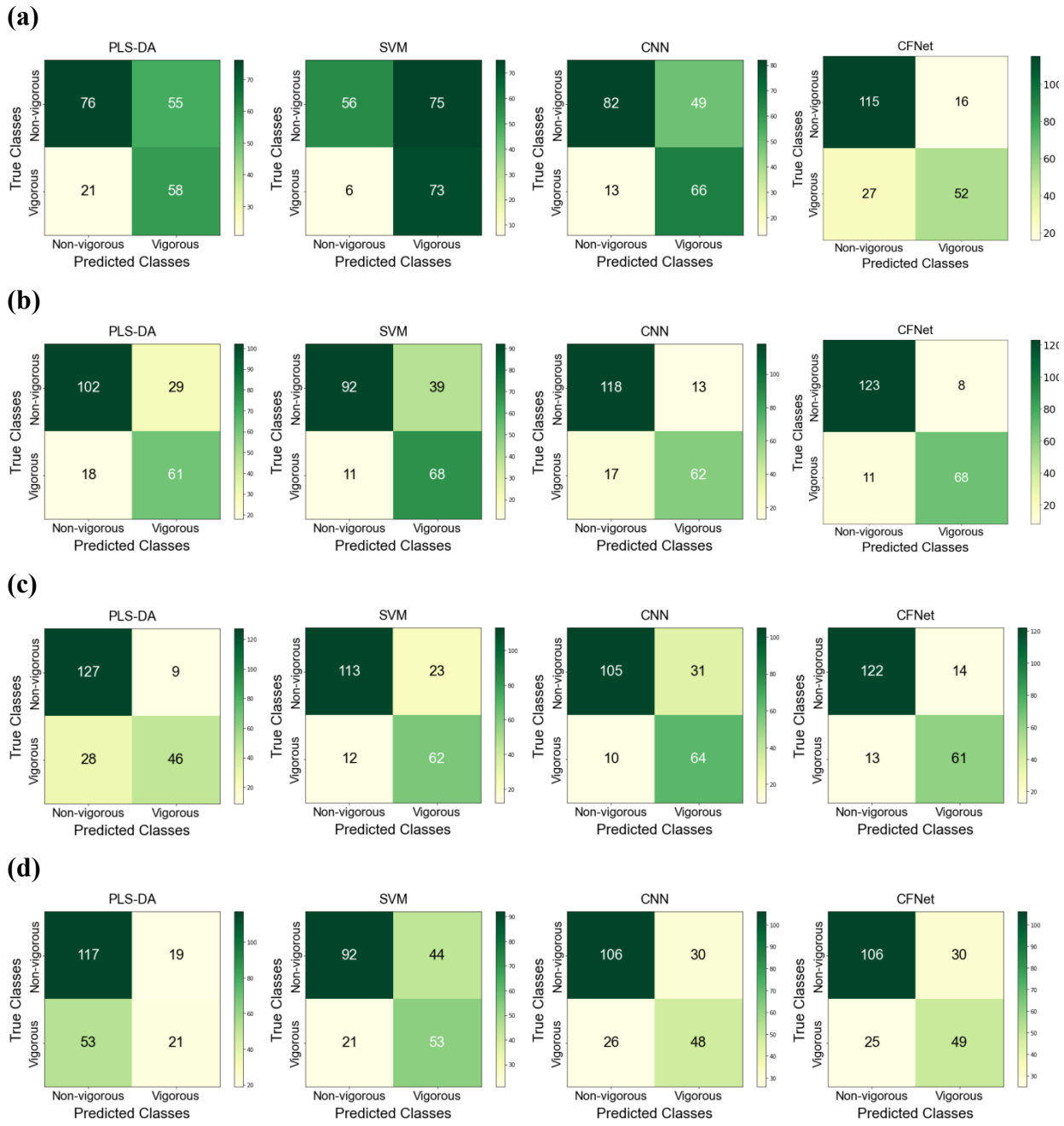

Figure S1 Confusion matrices of different models for vigor classification in naturally aged rice seeds. (a) HH31@VNIR, (b) HH31@SWIR, (c) MXZ2@VNIR, (d) MXZ2@SWIR

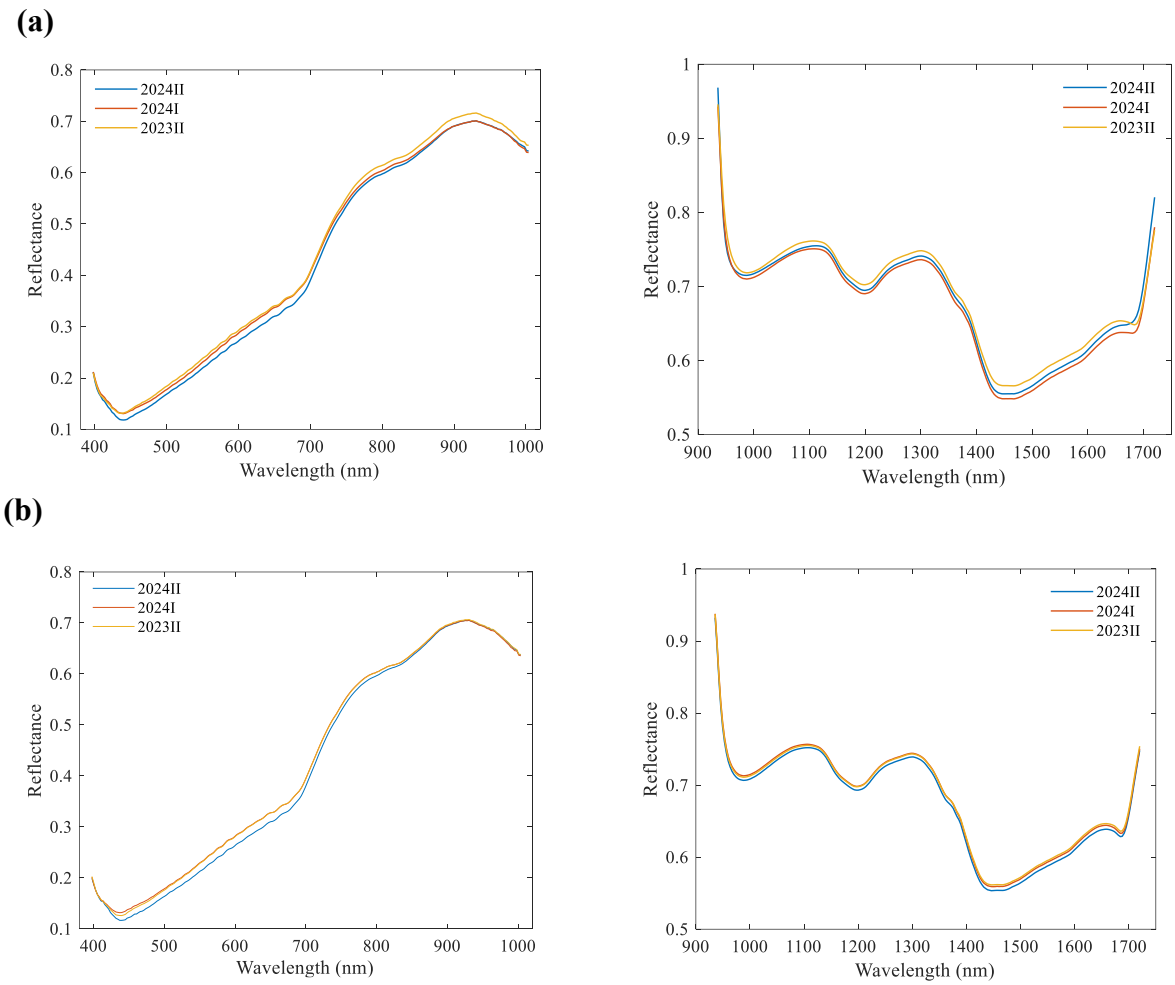

Figure S2 Mean spectral curves of three natural aging stages (2024II, 2024I, 2023II) in rice seeds. (a), HH31; (b), MXZ2.