**SUPPLEMENTARY MATERIAL**

**The full title:** Identifying an optimal machine learning algorithm for wheat yield estimation using multilevel UAV datasets

**Journal name:** Modeling Earth Systems and Environment

Supplementary Material

Supplementary Figure S1. Machine learning model results

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Supplementary Table S1. Machine learning model results with and without adjustment for multicollinearity

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| --- | --- | --- | --- | --- | --- | --- |
| Model name | R2  Testing | R2  Training | R2  Full | R2  Testing | R2  Training | R2  Full |
| **With** | | | **Without** | | |
| Linear  (LM) Model | 0.70 | 0.71 | 0.70 | 0.65 | 0.64 | 0.64 |
| Extreme Gradient Boosting (XGBoost) | 0.71 | 0.93 | 0.87 | 0.66 | 0.89 | 0.83 |
| Random Forest  (RF)Model | 0.71 | 0.95 | 0.88 | 0.67 | 0.94 | 0.87 |
| Decision Tree  (DT) Model | 0.44 | 1.00 | 0.83 | 0.39 | 1.00 | 0.82 |
| AdaBoost  Model | 0.62 | 0.67 | 0.65 | 0.59 | 0.64 | 0.63 |
| Extra Trees  (ET) Model | 0.70 | 1.00 | 0.91 | 0.66 | 1.00 | 0.90 |
| Gradient Boosting (GB) Model | 0.69 | 0.74 | 0.73 | 0.68 | 0.71 | 0.70 |

Supplementary Figure S2. SHAP plot results

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| --- | --- |
| XGBoost Model | Random Forest Model |
|  |  |
| Decision Tree Model | Extra Trees Model |
|  |  |
| Gradient Boosting Model | AdaBoost Model |
|  |  |