Supplementary Material

Table S1. Optimal parameters of machine learning algorithm under different factor combination Schemes.

Method	Parameters	Scheme1	Scheme2	Scheme3	Scheme4
RF	mtry (number of predictors sampled for spliting at each node)	13	9	9	11
	mtrees (number of trees grown)	500	500	500	500
XGB	eta (control the learning rate)	0.4	0.4	0.4	0.4
	max_depth (maximum depth of a tree)	3	3	3	3
	colsample_bytree (subsample ratio of columns when constructing each tree)	0.8	0.8	0.8	0.8
	min_child_weight (minimum sum of instance weight needed in a child)	1	1	1	1
	subsample (subsample ratio of the training instance)	1	0.75	1	1
	n_rounds (max number of boosting iterations)	150	150	150	150
SVM	sigma (the scale parameter of the hypothesized laplace distribution estimated by maximum likelihood)	0.128	0.061	0.059	0.042
	C (constant of the regularization term in the Lagrange formulation)	1	1	1	1
KNN	k (number of neighbours considered)	20	20	20	20

Table S2. StepLm fitting equation.

Scheme	Equation
1	$y = -1.063T - 0.507H - 0.419H_8 - 1.546H_{15d} + 4.857W_8 - 23.385W_{3d} + 45.289W_{15d} - 0.002S_{16} + 0.002S_{15d} + 290.37$
2	$y = -0.554T - 0.397H_8 + 0.597H_{3d} - 0.752H_{15d} + 2.649W_8 - 20.493W_{3d} - 36.678W_{15d} - 0.003S_{16} - 0.004S_{15d} - 43.819MH + 3673.065MDBH + 37.54MFSH - 234.716CD - 7.776$
3	$y = -0.512T + -0.411H_8 + 0.583H_{3d} - 0.829H_{15d} + 3.113W_8 - 19.582W_{3d} - 23.956W_{15d} - 0.003S_{16} - 0.004S_{15d} - 2.993Alt - 9.041Asp - 5.537SG - 171.903SP + 1262.184$

Scheme	Equation
4	$y = -0.47T - 0.396H_8 - 0.774H_{15d} + 0.598H_{3d} + 2.821W_8 - 20.422W_{3d} - 36.985W_{15d} - 0.003S_{16} - 0.004S_{15d} - 76.485MH + 5860.138MDBH - 243.847CD + 50.718MFSH - 0.414Alt + 6.01Asp + 3.07$

Note: The full names of factors are shown in Table 3.

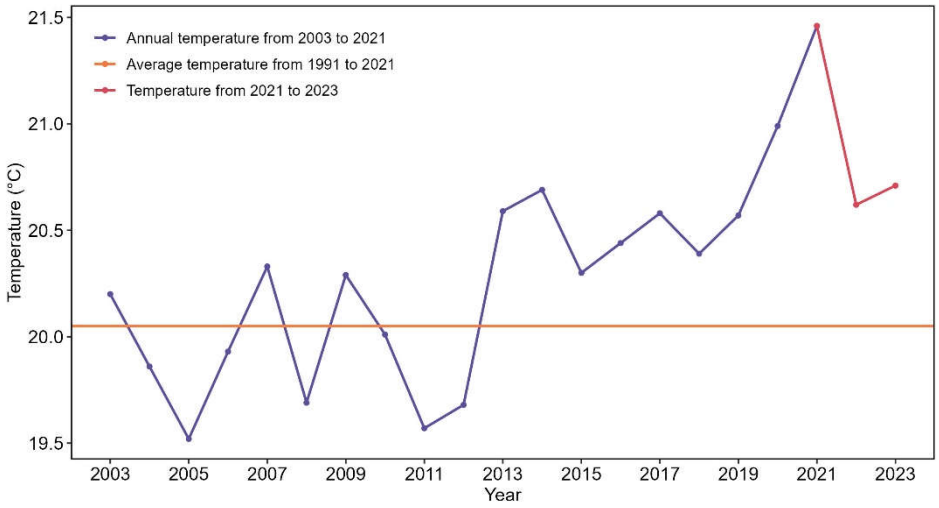

Figure S1. The change of average annual temperature in Gannan in recent 20 years.

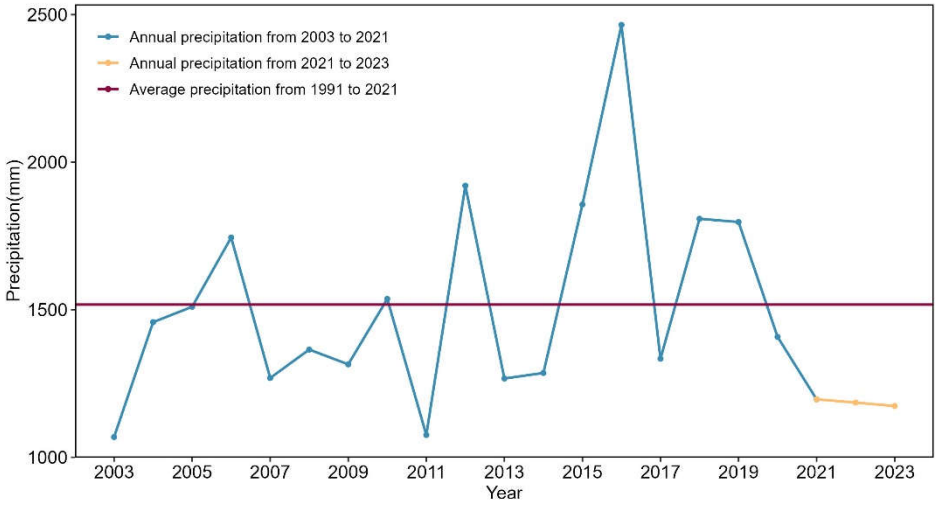

Figure S2. The change of average annual precipitation in Gannan in recent 20 years.

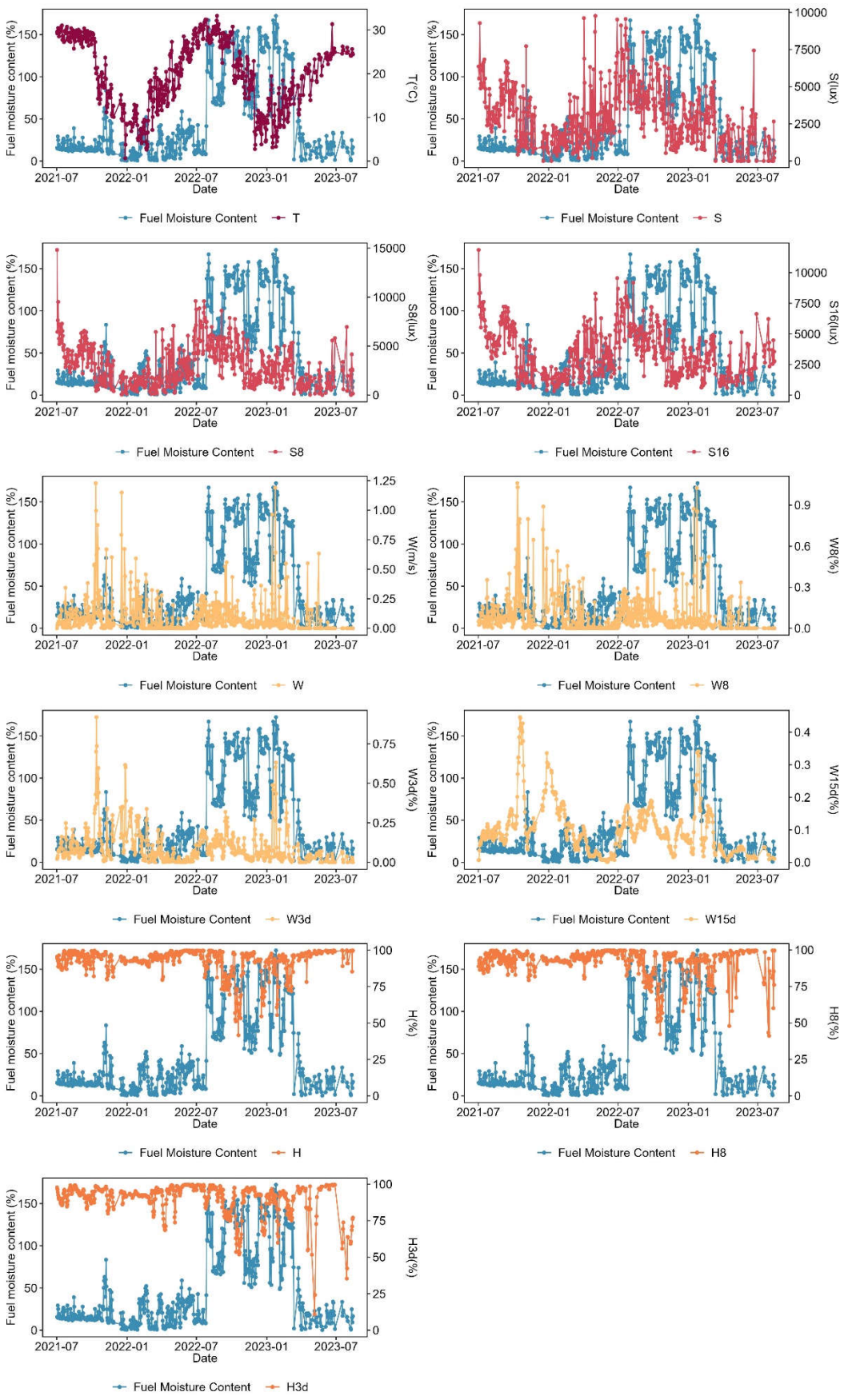

Figure S3. Time series of fuel moisture content and meteorological variables. The full names of the meteorological factors are shown in Table 3.