

Table S7. The linear regression analysis results revealed that rainfall, daytime humidity, daily maximum, and minimum temperatures were the most influential climatic factors that drove Sclerotinia head rot (SHR) of sunflower across various planting dates sown in 2021/2022 in an open field at 5% significance level. Daily maximum temperature (Tmax) slowed the disease progression in November planting date significantly (p value 0.006) and $R^2 = 0.962$. Rainfall, and daily minimum temperature (Tmin) positively influenced disease progression in October, and December and February planting dates, respectively. Daytime humidity (Hmax) positively influenced disease progression in January planting date. In March planting date, daily minimum temperature slowed the disease progression. The data used for analysis was from day of inoculation to 30 dpi, recorded at 3-day intervals for both climatic factors and AUDPC scores across the six planting dates. The sample size was ten biological replicates for each planting date, selected randomly from three replicates in a split plot design.

Planting date	Tmax	Tmin	Rainfall	Hmax	Hmin	R ²	RMSE	F	Pr>F
Oct	0.519	0.090	0.238*	-0.261	-0.272	0.309	4.514	0.357	0.856
Nov	-0.820*	-0.760	0.718	0.131	0.240	0.962	0.337	20.519	0.006**
Dec	-0.535	-0.794*	-0.021	0.142	-0.100	0.706	4.020	1.920	0.274
Jan	-0.371	-0.482	0.365	0.415*	0.328	0.353	6.861	0.437	0.806
Feb	-0.603	-0.588*	0.385	0.099	-0.003	0.571	5.058	1.066	0.489
Mar	0.532	0.209*	-0.180	-0.503	-0.224	0.494	3.714	0.782	0.611

- *Multiple linear regression analysis results. Significance level: 5%, ** show significance of the most influential variable at $p < 0.01$. The most influential variable on Sclerotinia head rot progression is indicated by *.*