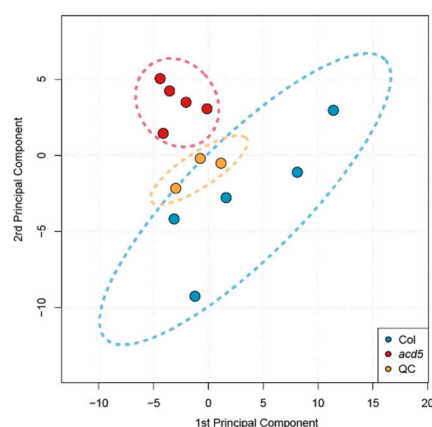
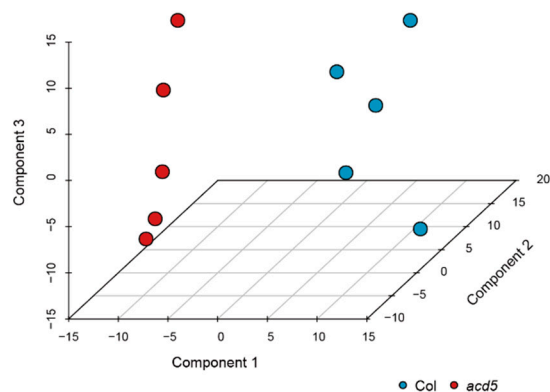


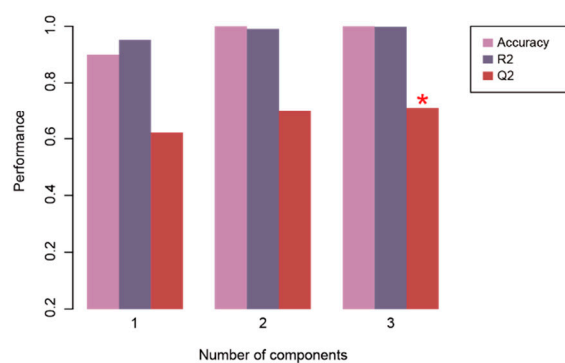
Figure S1. Total ion chromatograms of ceramide kinase mutant *acd5* and wild type Col in positive and negative ion modes. The four coloured lines represent the total ion flow diagram of Col and *acd5* in positive and negative ion modes, respectively.



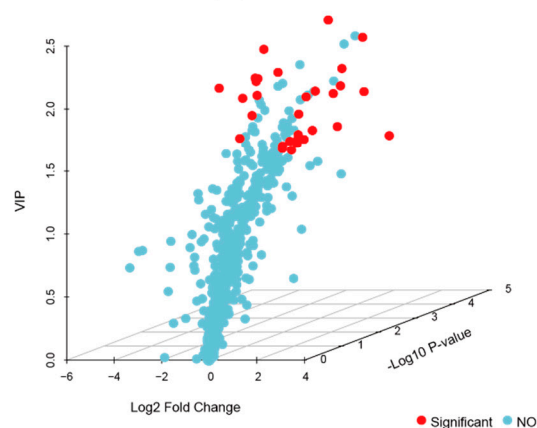
(a)



(b)



(c)



(d)

Figure S2. Multivariate statistical analysis of metabolome in *acd5* mutants and wild-type plants. (a) PCA score plot of ceramide kinase mutant *acd5* and wild type Col-0. The horizontal coordinate represents the score of PC1, and the vertical coordinate represents the score of PC2. (b) A PLS-DA 3D score plot of *acd5* and wild type. (c) PLS-DA classification and feature selection. (d) A three-dimensional scatter plot showing the screened differential metabolites. The red points indicate significantly different metabolites, with the x-axis representing the Log2 fold change, the y-axis representing the $-\log_{10}$ P-value, and the z-axis representing the VIP value