Understanding crop phenology is fundamental to crop management, where timing of management practices is increasingly based on stages of crop development. Simulating canopy development is also critical for crop growth models, whether to predict the appearance of sources and sinks, determining carbon assimilation and transpiration, partitioning carbohydrates and nutrients or determining critical life cycle events such as flowering and maturity.

PhenologyMMS is a simulation model that outlines and quantifies the developmental sequence of different crops under varying levels of water deficits, provides developmental information relevant to each crop, and is intended to be used either independently or inserted into existing crop growth models.

A Java-based interface is used for the standalone model that allows the user to interact with the underlying Fortran simulation model. The model requires daily maximum and minimum air temperature and precipitation (historical climate information for selected sites is provided), planting date and depth, and general soil moisture description at time of planting. The model calculates when each growth stage is reached by one of two methods: either growing degree-days (GDD) or number of leaves. Default values are provided for the GDD that must accumulate or the number of leaves that must be produced between each growth stage for both stressed and unstressed environments. Currently, ten common crops grown in the Great Plains are parameterized: winter and spring wheat, winter and spring barley, corn, dry beans, sorghum, sunflower, proso millet, and hay millet.

The model outputs the date each growth stage is reached by the specific crop and how many days each stage occurs after planting, emergence and vernalization, if applicable. It also displays the GDD values for the growth stages after planting, after emergence and after vernalization as well as the number of leaves produced at each growth stage. Final plant height is estimated.

PhenologyMMS is a model under current development, and is therefore continually being updated. This website will always have the most current version available for download.

The most recent version (V1.3) was uploaded **Wednesday, May 15, 2013**.

Quick Guide and Download User Instructions

Be sure to read and follow the Installation Instructions carefully.

Always try to install PhenologyMMS in the default directory, if possible.

After installation, you can put an icon on your desktop as described in the Installation Instructions.

Run the PhenologyMMS Program by double-clicking the desktop icon or alternatively double-clicking on the C:\PhenologyMMS13\PhenologyMMS.jar file. If double-clicking does not begin the program, right click on the .jar file and choose Open.

On the Begin Setup screen, select a crop and the weather/location file. It is suggested to not load a scenario until you are more familiar with the program.

Other User notes for each screen can be accessed by the Help button.