use as a research tool for choosing the most appropriate strategy prior to conducting field experiments (Cheyglinted *et al.*, 2001).

There were four input data sets to be used for running the CSM-CERES-Rice model including soil data, weather data, management data and crop characteristics data or crop genetic coefficient (GC) (Hoogenboom *et al.*, 1999). In the past, crop modelers used two techniques to calculate GC of a rice variety under observed weather data and known crop development and growth data sets. The first method was by trial-and-error and the second was calculation technique such as the Genetic Coefficient Calculator (GENCALC), which used a deterministic stepwise procedure to automatically adjust the coefficients with values within the plant's realistic physiological ranges (Hunt *et al.*, 1993; Pabico, 2008).

Another program to estimate genotype-specific coefficient for the CSM-CERES-Rice model was GLUE (Generalized Likelihood Uncertainty Estimation) program (He *et al.*, 2008; He *et al.*, 2010). It was a Bayesian estimation method that uses Monte Carlo sampling from prior distributions of the coefficients and a Gaussian likelihood function to determine the best coefficients based on the data that were used in the estimation process. Both of GENCALC and GLUE were included in DSSAT v4.5 package. There were advantages and disadvantages of using these estimators. Disadvantages of the GLUE technique was that it may require a lot of time for the computations, depending on the number of treatments selected for the estimation process (He *et al.*, 2008). On the other hand GENCALC needs more manual operation than GLUE.

Transition production system from DWR production to modern FDR production system was challenge for farmer who getting familiar with low input of traditional DWR production system. There were not only planting date and variety but also fertilizer management was another significant factor to improve rice yield. The combination of appropriate application techniques in tern of mode, time and rate of N application was challenge task for the farmers. Integration of field experiment and crop model simulation was powerful strategy to formulate alternative management practices for farmer to select under specific environment and constraints of their field.

Crop yields were influenced by many interacting and often co varying environmental and biological factors, with the result that it was usually difficult to disentangle the effects of any one factor in field experiments. With irrigated and well fertilized crops in the tropics, however, fluctuations in nutrient and water supply and seasonal changed in day length and temperature were minimized, whereas exposure to different sequences of irradiance during crop development was maximized by the ability to plant and harvest crops in all months of the year (Evans and De Datta, 1979).

However, the CSM-CERES-Rice model could be an alternative tool to test the strategies at both research and farm levels. Recent advances of analysis through simulation using microcomputers enabled alternative strategies to be tested over several years and this allowed the researchers to select optimum strategies for field testing. Hence, this was a study to evaluate the CSM-CERES-Rice model in Decision Support System for Agrotechnology Transfer version 3.5 (DSSAT v3.5) (Kerdsuk, 2002; Mankeb, 1993) with the field data from selected rice research stations in Thailand, for its applicability in determining appropriate technologies and their levels for rice production in this region (Cheyglinted *et al.*, 2001). The CSM-CERES-Rice a sub model in DSSAT v3.5 was used to simulate growth and yield of four common rice varieties in Thailand with the attention on rate and timing of N application, a factor that most limits crop yield. The model predicted slightly higher grain yield than that observed for all varieties at N input of 75 kg ha^{-1}, but the differences between observed and simulated yields were not significant, except for varieties HSP and SPR90 (Cheyglinted *et al*., 2001). The precision between simulation and observation data could be defined. The smaller the RMSEn value was the higher the precision, when RMSEn<10%, the simulation results were good; when 10%<RMSEn<20%, the simulation results were fairly good; when 20%<RMSEn<30%, the simulation results were moderate; and when RMSEn>30%, the simulation results were poor (Michele *et al*., 2003).

This research started with the problem situation of transition from DWR to FDR production system in deepwater area. Then field experiments were conducted for finding appropriate technologies for FDR production, e.g. planting date, variety and fertilizer management. However, field experiment was time and budget consuming. Another weak point was that it could only be representative of the production under the environment of the experimental site. Crop modeling could be used as a tool to overcome this weak point of field experiment. Calibration of crop modeling (CSM-CERES-Rice in DSSAT v4.5) was done to calibrate rice coefficients for the best simulation output base on observation data comparison. Then the best coefficient was used the simulate rice growth and phenology under different set of environment for model evaluation.