Nyein Nyein Phyoe 2006: Physiological Responses of Cotton (*Gossypium hirsutum* L.) to the Intercropping with Mungbean (*Vigna radiata* L.). Master of Science (Tropical Agriculture), Major Field: Tropical Agriculture, Interdisciplinary Graduate Program. Thesis Advisor: Assistant Professor Poonpipope Kasemsap, Ph.D. 73 pages.
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Intercropping of cotton and mungbean is one of the effective approaches to make cotton production financially attractive to farmers by additional income of mungbean. Cotton and mungbean intercropping experiment was conducted at Kasetsart University National Corn and Sorghum Research Center, in the summer season of 2006. Five treatments were Treatment 1, cotton monocropping; Treatment 2, mungbean monocropping; Treatment 3, one mungbean row between one cotton row; Treatment 4, two mungbean rows between one cotton row and Treatment 5, three mungbean rows intercropped between two cotton rows alternating with no mungbean row. The objective of this study was to examine the physiological responses of cotton to mungbean intercropping. The light interception efficiencies (LIE), canopy photosynthesis, yield and yield components, productivity of the two crops and insect diversity of intercropping systems were observed. LIE of cotton and mungbean in intercropping systems was determined by VegeSTAR software with plant-level digitized data of cotton and mungbean using 3D-electromagnetic digitizer. Open system gas exchange chambers were used to measure canopy photosynthesis (P_n).

Photosynthetic capacities (P_{max}) of cotton or mungbean in monocropping were greater than those in intercropping. Light saturation was attained at lower irradiances in intercropping treatments. Intercropped cotton and mungbean had less LIE and consequently P_n was affected by smaller LIE. Seed cotton yield was related to photosynthesis and therefore P_n reduction of cotton in the intercropping systems led to the reduction of seed cotton yield. Cotton yield reduction in intercropping was caused by square and young boll abscission and it was partly due to the light competition between intercropped species which reduced cotton P_n and, consequently less carbohydrate supply. Planting configuration (spacing and orientation of plant rows) of intercropped species needs careful consideration in order to minimize light competition between intercrops for getting higher P_{max} to provide the greater yield in intercropping systems. In this study, though mungbean intercrops reduced the seed cotton yield, it gave profitable cropping systems because the overall yield production of the two crops gave the higher productivity base on land equivalent ratio analyses. Greater numbers of beneficial insects were also recorded in intercropping systems.

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