ABSTRACT

Title : Physiological Response of Different Upland Rice Varieties to Soil Moisture and Temperature

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The objectives of this investigation were to study physiological responses of different upland rice varieties under various soil moisture stress and low temperature. The study was further aimed to examine relation between stem and root growth and the association effects on grain yields. The study consisted of 3 parts: (i) study on root system and vegetative growth of upland rice varieties under optimum soil moisture condition, (ii) study on root system, vegetative growth and grain yield of upland rice under rainy and cool season and (iii) study on responses of two upland rice varieties to water stress condition at different growth stages.

The results from the first experiment showed that three upland rice varieties namely Nam Roo, Sew Mae Jan and Jao Khoa had better root system with higher stem dry weights. The average root length ranged from 30.95 to 35.00 centimeters, with average stem dry weights of 1.82 to 2.63 grams per hill. The average leaf height above ground level (at 3 weeks after seeding) ranged from 34.3 to 37 centimeters with average leaf length per plant (at 6 weeks after seeding) varied from 59.6 to 94 centimeters. In addition, average leaf area per hill at 3 and 6 weeks after seeding ranged from 34.19 to 36.59 and 42.40 to 53.82 cm^2 respectively. The second experiment was conducted under field condition and the results also indicated these three varieties had good performance with high grain yield of

between 870.63 to 1264.38 kilograms per hectare(139.3-202.3 kilograms per rai). By correlation analysis, the upper ground plant part such as plant height, tillering number, leaf blade per plant, leaf length per plant, and leaf area index at 3 and 6 weeks after seeding could be used to predict root system with correlation coefficient between 0.15616-0.71402. In addition, it was observed that the upper ground plant part at 3, 6 and 9 weeks could also be used to predict grain yield with correlation coefficient of 0.22740-0.68955. In cool season the upland rice produced lower vegetative growth than those in rainy season with no grain yield due to sterility.

The results from the third experiment indicated that critical period for Jao Khao and Sew Mae Jan was 50-60, 60-70 and 80-90 days after seeding. These periods are coincidence with panicle initiation and grain filling. For the interaction between upland rice varieties and water stress it was found that Sew Mae Jan yielded 12.64 percent higher than Jao Khao at field capacity. Water stress at 30-40, 40-50 and 80-90 days after seeding reduced yield of Sew Mae Jan by 24.23 percent as compare to Jao Khao, but showed slightly different for the other growth period.