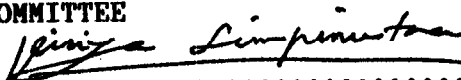



THESIS TITLE GROWTH AND YIELDS OF 3 LEGUMES PLANTED AFTER RICE
IN PADDY FIELDS WITH 3 MOISTURE REGIMES

AUTHOR MISS BUPHAR KHONGMORN

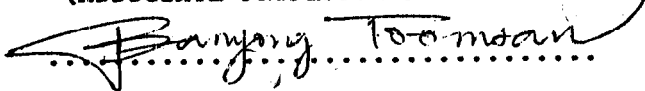
THESIS ADVISORY COMMITTEE

..........CHAIRMAN

(DR.VIRIYA LIMPINUNTANA)

..........

(ASSOCIATE PROFESSOR DR.NIMITR VORASOOT)

..........

(DR.BANYONG TOOMSAN)

ABSTRACT

The objectives of the experiment were to compare the growth and yields of 3 leguminous crops planted after rice in paddy fields with 3 levels of moisture regime. The experiment was conducted from 15 December 1989 to 11 April 1990 on the sandy loam soil (Satuk series) in Ban Khok Yai, Ban Fang district, Khon Kaen province. The experiment consisted of the randomized complete block layout with 3 treatments on 3 locations. The treatments consisted of 3 legumes including peanut (cv. Tainan 9) soybean (cv. SJ4) and cowpea (cv. KVC-7). Locations included upper, middle, and lower paddy fields with low, medium and high residual soil moisture respectively.

Peanut planted on the lower paddy field produced significantly higher seed yield per area (208 kg per rai) than peanut planted on the middle and upper paddy fields, which having the

yields of 119 and 118 kg per rai respectively. Peanut growth on the upper plot might be under water stress at the late vegetative to reproductive phases as the soil moisture content measured at 0-30 cm was much lower than the level at field capacity. As the consequence, peanut planted on the upper plot had significantly lower pod number per plant and also tended to have less plant number per area, seed number per plant, 100 seed weight and harvest index than peanut planted on the lower field. Peanut planted on the middle plot had poorer growth and seed yield than that planted on the lower plot. Peanut on the middle plot might suffer from waterlogging at the late reproductive to early pod filling phases as rainfall caused the soil moisture content measured at 0-15 cm depth to be higher than the level at field capacity from week 9 to week 11 after planting. Furthermore, peanut planted on the middle plot might also have water stress during the last 3 weeks of growth as the soil moisture content was much lower than the level at field capacity.

Soybean planted on upper paddy field produced significantly less seed yield per area (59 kg per rai) than soybean on lower and upper plots (108 and 103 kg per rai respectively). Soybean growth on the upper plot might suffer from water stress during the late vegetative to late reproductive phase as the soil moisture content measured at 0-30 cm was lower than the level at field capacity. This water stress might cause soybean plants on the upper plot to mature earlier and hence produced significantly lower pod number per plant than those on the other paddy fields. Soybean on the upper plot also tended to have less plant number

per area and harvest index than soybean planted on the lower and upper plots.

Cowpea grown on the upper, middle and lower paddy fields produced similar levels of seed yield per area (111, 101 and 94 kg per rai respectively). In contrast to soybean and peanut, growth, yield, yield components and harvest index of cowpea on upper and middle plots were not affected by either soil water deficit or waterlogging during the late vegetative to early pod filling phase. Cowpea also had faster growth than the other two legumes at the early growth stage (0- week 4 after planting). Cowpea and peanut also had larger proportion of roots in the soil at 60-100 cm depth than soybean.

From this experiment, conclusion can be drawn as follows. Cowpea was the only plant that could grow well on all three levels of paddy fields with different moisture regimes. Peanut seemed to perform well only on the lower paddy field whereas soybean seemed to grow better on the lower and middle than on the upper paddy fields. The lower paddy field with high moisture regime could be successfully planted with all three legumes. The middle paddy field with medium moisture regime could be planted with cowpea and soybean whereas the upper paddy field with low moisture regime could be planted with cowpea.

When compared seed yield per area of the three legumes from this experiment with those obtained elsewhere in the Northeast region, cowpea and peanut were the only two crops that seemed to be suitable to plant after rice by using residual soil moisture. This was because seed yield per area of cowpea obtained from this

experiment was about 94-111% of the average yield mentioned for the region. Similarly, seed yield per area of peanut was about 65-115% of the yield obtained from peanut grown after rice with residual soil moisture at Surin. In contrast, seed yield per area of soybean was only 32-59% of the average yield recorded for the Northeast region.