

**Thesis title** Selection for High Yield and Lodging Resistance in Soybean Breeding Populations.

**Author** Miss Patcharin Fipet

**M.S.** Agriculture (Agronomy)

**Examining Committee:** Assoc. Prof. Dr. Dumrong Tiyawalee Chairman  
Assist. Prof. Suthat Julsrigival Member  
Lecturer Phrek Gypmantasiri Member  
Assoc. Prof. Dr. Chuckree Senthong Member

### Abstract

The objectives of the study were to develop high yielding and lodging resistance soybean breeding lines from three different breeding populations. Individual plant selection based on lodging score 1 to 5 was attempted after rain storm at maturity. Late generation of these populations derived from three single crosses of CM001-1xIN6, CM001-1xIN18 and CM001-1xOCB were evaluated for high yield and lodging resistance performance during the dry growing season in 1993 at Agronomy Farm, Faculty of Agriculture, Chiang Mai University. Single seed descent was employed for extending of  $F_1$  to  $F_5$  generation in these three soybean populations. In 1992 dry season, segregating materials were planted and selected for high seed yield and lodging

resistance. In this experiment lodging score 1 to 5 (1.0 = highly resistance, 5 = highly susceptible) developed by Hoggard *et al.*, (1978) was used for a basis of selection. A total of 109 plants were selected from the populations and grown separately in a 2 x 6 m<sup>2</sup> plot in subsequent rainy growing season. During harvesting time, selection based upon plot basis was carried out for seed yield and uniform agronomic characters i.e. height, maturity, etc. In 1993 dry growing season, a total of 24 lines, which composed of 17, 1 and 6 lines derived from population of single crosses CM001-1xIN6, CM001-1xIN18 and CM001-1xOCB, respectively, were evaluated for seed yield and stem lodging resistance. A split plot design with two replications was used. Breeding line was assigned as main plots and two different levels of plant densities, 3 plants/hill (38,400 plants/rai) and 5 plants/hill (64,000 plants/rai) were assigned as sub plots.

Results showed that there were not significant different in seed yield between the two planting densities but were highly significant difference among the lines tested. When plant densities was increased from 38,400 plants/rai to 64,000 plants/rai lodging score was also increased as well as due to plant height. In contrast number of node, pod per plant, and seed size were decreased. Average seed yield obtained from the cross CM001-1xIN6 ranged from 261.52 to 525.18 kg/rai with low lodging score ranged from 1.00-3.67. The only single line derived from the cross CM001-1xIN18 (line #51) produced the highest seed yield of 573.92 kg./rai with lodging score of 3.83. However, arose from the cross CM001-1xOCB populations produced the lowest yield,

ranged from 420.87-470.59 kg/rai with lodging score, ranged from 2.33-3.67. For maturity date lines, of these selected, it learned that lines derived from CM001-1xIN6, CM001-1xIN18 and CM001-1xOCB populations were 97-115, 115, and 90-98 days respectively.

Finally, results could be summarized as followed:

1) Preliminary yield test of selected breeding lines gave satisfactorily stem lodging resistance, In spite of high plant density, 64,000 plants/rai, and under stormy and heavy rains seed yield reduction was not noticed. So, the selection procedure employed was effective in improving stem lodging resistance in soybean.

2) Lines that are resistant to stem lodging are different showed in yielding ability among the populations. For example, seed yield obtained from lines arosed from the cross CM001-1xIN6 ranged from 261.52 to 525.18 kg/rai while lines derived from the crosses CM001-1xOCB and CM001-1xIN18 produced seed yield ranged from 420.87 to 470.89 kg/rai, and 573.93 kg/rai, respectively.

3) It was interesting to note that there were some agronomic characters i.e. number of node per plant and plant height associated slightly with stem lodging resistance. Among the lodging resistance families, it possessed 9.25-13.56 nodes per plant and plant height of 63.45-119.66 cm.

4) It was obvious that lines which exhibited tall plant statures will increase stem lodging. Results obtained from the studies on seed yield correlation revealed that plant height was

slightly associated with seed yield. In addition, it was found that seed yield was positively correlated with pod per plant. Thus, this trait could be used as selection criteria for improving soybean seed yield.