

ABSTRACT

STUDY ON GENE ACTION CONTROLS YIELD AND QUALITY OF
BURLEY TOBACCO BY MATING DESIGN II

BY

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In order to study gene action controls yield and quality of Burley tobacco, three cultivars; TN 90, KY 14 and Khongpho were used as reference populations. By applying a Cross Design or Mating Design II to the three cultivars, the result showed three sets of crosses; KY 14 × TN 90, Khongpho × TN 90 and Khongpho × KY 14. Each cross consisted of 20 progenies. The progenies were produced by crossing each of four male plants to five female plants. The sowing seeds were randomly chosen by cluster sampling with 20 progenies from each cross evaluated using a Randomized Complete Block Design in three replications for 2 seasons. The first three experiments were carried out during early rainy season in 1998 (April) and other three experiments were conducted during late rainy season in 1999 (April) at Mae Jo Tobacco Experiment Station, Chiang Mai. Estimation of the F₂ progenies of KY 14 × TN 90, Khongpho × TN 90 and Khongpho × KY 14 indicated that additive genetic variance was greater than the dominance in number of leaves, leaf length, leaf width and dry weight contrary to plant height and days to flower where dominant genetic variance was greater. Narrow sense heritabilities of all agronomic characteristics were ranked from - 0.32 to 0.79. The higher heritabilities indicated that considerable progress could be expected from selections in the population. However, the 8 varieties were selected from the 3 crosses for a further improvement in the breeding program. These were KY 14-3 × TN 90-3, KY 14-2 × TN 90-4 and KY 14-4 × TN 90-2 from KY 14 × TN 90 which

had leaf dry weight at 377.4, 353.3 and 342 kg per rai, respectively. Khongpho-5 × TN 90-3, Khongpho-2 × TN 90-4 from Khongpho × TN 90 gave leaf dry weight of 414.3 and 389.9 kg per rai, as well as Khongpho-4 × KY 14-2, Khongpho-2 × KY 14-4 and Khongpho-1 × KY 14-4 from Khongpho × KY 4 gave the leaf dry weight of 360.8, 339.9 and 317 kg per rai respectively. Multiple regression analyses were used to determine the days to flower, number of leaves and plant height as selection index for the tobacco yield in terms of the leaf dry weight. It is suggested that the best selection method for all characteristics controlled by additive genes is pure line selection in order to accumulate the additive genes from a generation to many generations.