Lalida Ardsoongnern 2009: Study of Genetic Diversity among Sunflower (*Helianthus annuus* L.) Inbreds Using Morphological Characteristics and Amplified Fragment Length Polymorphism (AFLP) Markers. Master of Science (Agricultural Biotechnology), Major Field: Agricultural Biotechnology, Interdisciplinary Graduate Program. Thesis Advisor: Miss Buppa Kongsamai, Ph.D. 152 pages.

Genetic diversity of fifty-six sunflower inbreds and three checks (commercial varieties; Hybrid I, Hybrid II and Hybrid III) was assessed with morphological characteristics and AFLP markers. The experiment was conducted at the Agronomy farm, Kasetsart University, Kamphaeng Saen Campus, in 2007. Based on twenty-six morphological characteristics, genetic distance among groups and phylogenetic tree were constructed by unweighted pair group method with arithmetic averages (UPGMA). Sunflower inbreds were grouped into two major clusters with dissimilarity coefficients of 0.00-0.44. The first group represented no seed mottling and the other represented seed mottling in which comprised of two minor groups; oil seed and non-oil seed types.

Fifty-nine AFLP primers were analyzed. Only twenty-three primers showed highly polymorphic and 1,963 bands (averaged 85.35 bands/primers) were produced which 1,278 bands (64.85%) gave polymorphism. Polymorphic Information Contents (PICs) ranged from 0.00-0.50 with mean PICs of 0.293 and 247 markers (12.58 %) were in the range of 0.45-0.50. The genetic relationship in sunflower varieties has similarity coefficients between 0.37-1.00. Phylogenic tree was constructed by UPGMA divided sunflower varieties into two groups. The first groups represented restorer (R) line while the second group represented maintainer (B) line that separated into two minor groups of oil seed and non-oil seed types. Similarity coefficients were also calculated with Principal Coordinate Analysis (PCoA). It showed that principal component (PC) 1, 2 and 3 accounted for 40.95, 23.66 and 17.21 percent, respectively, relative to total variation. The distribution pattern using PCoA method was agreement with UPGMA method. From this study, it indicated that utilization of AFLP markers and morphological data was more efficiently classified sunflower inbreds into R-line and B-line groups than that of morphological data alone, especially when sunflower inbreds had similarly morphological. However, the information of this study could be able to use for selecting the parents for further sunflower breeding programs.

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