ABSTRACT

DWI GUNTORO. Morphological and Genetic Diversity and Degree of Competition of Several Echinochloa crus-galli (L.) Beauv. Accessions to Rice. (Supervised by M. AHMAD CHOZIN, EDI SANTOSA, SOEKISMAN TJITROSEMITO, and ABDUL HARRIS BURHAN).

Weed disturbance is an important issue in rice production in Indonesia. Echinochloa crus-galli (L.) Beauv. is the most dominant weed in rice leading to loss of production. The research aims to analyze the morphology and genetic diversity of weeds accession E. crus-galli from West Java and degree of competition of E. crus-galli to rice.

Research was carried out by using several steps, i.e: (1) Preliminary experiments on growth and production of rice with E. crus-galli weed population levels originating from three locations, (2) Morphological and genetic evaluation, (3) Identification of potential weed allelophaty E. crus-galli accession, (4) Study effect of E. crus-galli accession on the growth and rice production (greenhouse experiments), (5) Effects of accession and population rate of E. crus-galli on the growth and rice production (field trial), (6) Estimation of degree competition of E. crus-galli by the replacement series method, (7) Study of physiology competition between rice with weeds.

Results showed that E. crus-galli accession from West Java exhibited morphological and genetic diversity. Accession from different geographical locations showed differences in morphology. The diversity of morphology is presumably due to the phenotypic plasticity and adaptation ability of E. crus-galli accessions. Cluster analysis based on SSR molecular markers produced four subgroups with similarity coefficient of 0.86, with most of the group clustered in geographic zones of western West Java and northern. This genetic diversity might be caused by the movement of genetic material through harvest or through irrigation, isolation distance, and the possibility of mutation.

E. crus-galli accessions had the potential allelophaty based on inhibit of radicle and plumula growth of rice. Based on the potential allelophaty, the accessions clustered to six groups at 0.72 similarity coefficient. Each accession of E. crus-galli showed a potential difference in reducing the growth and yield of rice plants. This ability is probably related to morphological characteristics and allelophatic potential. Accession K6 from Karawang showed the highest ability to suppress the growth and production of rice plants.

E. crus-galli weed had a higher degree of competition to rice plants when the weed population was higher than the population of rice plants. Based on the value of aggressiveness, E. crus-galli competed stronger than rice when the population of rice plants and weeds is equal or weed population was higher than that of rice population. Each rice variety had a different response to population levels of E. crus-galli. The competition between rice plants with a E. crus-galli inhibited the physiological process of rice plant.

Key words: Echinochloa crus-galli, morphology, genetic, diversity, allelophaty, competition, replacement series, physiology, rice variety.