Floral traits and flowering behaviors of Malaysia rice cytoplasmic male sterile and maintainer lines and its relationship with out-crossing performance

ABSTRACT

Rice is a strictly self-pollinating crop. However, in hybrid rice seed production, an effective male sterility system is used to produce hybrid seed in bulk. In hybrid rice system, the pollen grains of cytoplasmic male sterile (CMS) are sterile and the female organ of the CMS depends on the fertile pollen released by the maintainer or restorer lines via out-crossing or cross-pollination in order to produce seed. Floral trait and flowering behavior of CMS and its corresponding maintainer or restorer lines are essential factors in hybrid rice seed production because they influenced the out-crossing or cross-pollination between parental lines. Two local CMSs and their corresponding maintainer lines were developed through breeding program in Malaysian Agricultural Research and Development Institute (MARDI) namely 0025A/0025B and 0047A/0047B. This study was carried out on floral traits and flowering behavior of these two hybrid line. Present studies have shown that there were variations between the CMS and its maintainer lines whether on floral trait or flowering behavior for both hybrid rice combinations. The results showed that stigma characters for both 0025A and 0047 were superior than their respective maintainers. Therefore, it is expected that the out-crossing rate would be high. Seeding date intervals need to be done on 0025A/0025B during nursery stage because the on-set of flowering between parental lines was significantly different. Panicle of both CMS was also classified as just exserted and partially-exserted and application of exogenous hormones such as gibberellic acid was useful to improve panicle elongation and consequently increase the seed set and yield. Correlation study indicates that the stigma area of both 0025A and 0047A has significant positive correlation with out-crossing rate.

Keyword: Anther; Flowering; Male sterility; Rice; Stigma