

INTISARI

Stabilitas genetik berperan penting terhadap keberhasilan transformasi genetik pada tanaman. Transgen umumnya akan diwariskan mengikuti hukum mendel. NPTII merupakan gen *selectable marker* dan umumnya tidak mempengaruhi fenotipe tanaman. Penelitian ini bertujuan untuk mengetahui pola pewarisan gen *nptII* dan fenotipe tanaman kosmos kuning pembawa gen *nptII* pada generasi kedua.

Penelitian ini dilaksanakan pada bulan Juni 2022 hingga Desember 2022 di laboratorium genetika dan pemuliaan tanaman serta rumah kawat, Fakultas Pertanian, Universitas Gadjah Mada. Penelitian stabilitas genetik dilakukan pada tanaman kosmos kuning T2, dengan bahan asal tanaman berasal dari benih kosmos kuning T1 yang positif mengandung gen *nptII*. Bunga tanaman kosmos T1 dilakukan perlakuan *self-pollinated* dan *open pollinated* pada bunga untuk menghasilkan benih T2. Lima belas sampel DNA tanaman dari setiap perlakuan diekstraksi dari daun kemudian dianalisis molekuler menggunakan metode PCR deteksi gen *nptII* ukuran produk 500 bp. Analisis segregasi dan stabilitas *nptII* didasarkan pada hasil PCR. Fenotiping tanaman transgenik dilakukan dengan menggunakan penanda morfologi pada karakter kualitatif dan kuantitatif pertumbuhan, daun dan bunga. Data rata-rata jumlah benih per bunga serta karakter kuantitatif dianalisis dengan Uji Beda Nyata Jujur Tukey dengan taraf 5 %, analisis segregasi dilakukan dengan Uji Chi Kuadrat.

Hasil penelitian diperoleh bahwa perlakuan *open pollinated* memperoleh jumlah rerata jumlah biji 19,57, persentase positif *nptII* 47,05% jika dibandingkan perlakuan *self-pollinated* yang relatif lebih rendah. Gen *nptII* diwariskan secara stabil mengikuti kaidah 1:1 pada perlakuan *self-pollinated* dan *open pollinated* berdasarkan pita DNA berukuran 500 bp. Fenotipe kualitatif tanaman transforman *self-pollinated* dan *open pollinated* mengalami perubahan dibanding tipe liarnya pada karakter tipe pertumbuhan, bentuk ujung daun, tipe pita bunga, serta susunan pita bunga. Fenotipe kuantitatif tanaman kosmos kuning T2 tidak berbeda nyata terhadap tipe liarnya.

Kata kunci: Stabilitas genetik, Kosmos kuning, NPTII, Transgenik

ABSTRACT

Genetic stability plays an important role in the success of genetic transformation in plants. Transgenes will generally be inherited according to Mendelian laws. NPTII is a selectable marker gene and generally does not affect plant phenotypes. This study aims to determine the pattern of inheritance of the nptII gene and the phenotype of the yellow cosmos plant carrying nptII gene in the second generation.

This research was carried out from June 2022 to December 2022 at the genetics and plant breeding laboratory as well as the wire house, Faculty of Agriculture, Gadjah Mada University. The genetic stability study was carried out on T2 yellow cosmos plants, with plant material derived from T1 yellow cosmos seeds that were positive for the nptII gene. Cosmos T1 flowers were treated with self-pollinated and open pollinated flowers to produce T2 seeds. Fifteen plant DNA samples from each treatment were extracted from the leaves and then analyzed molecularly using the NPTII gene detection PCR method with a product size of 500 bp. The nptII segregation and stability analysis was based on PCR results. Phenotyping of transgenic plants was carried out using morphological markers on the qualitative and quantitative growth, leaf and flower characters. Data on the average number of seeds per flower and quantitative characters were analyzed by Tukey's Honest Significant Difference Test with a level of 5%, segregation analysis was performed by Chi Square Test.

The results showed that the open pollinated treatment obtained an average number of seeds of 19.57, a positive nptII percentage of 47.05% compared to the relatively lower self-pollinated treatment. The nptII gene is inherited stably following the 1:1 rule in the self-pollinated and open pollinated treatments based on DNA bands measuring 500 bp. The qualitative phenotypes of the self-pollinated and open-pollinated transformant plants underwent changes compared to the wild type in terms of growth type, leaf tip shape, flower band type, and flower band arrangement. The quantitative phenotype of the T2 yellow cosmos plant was not significantly different from the wild type.

Keywords: Genetic stability, Yellow-cosmos, NPTII, Transgenic