

ABSTRAK

STUDI PERKECAMBAHAN BIJI, PERTUMBUHAN SEEDLING DAN AKLIMATISASI PLANLET ANGGREK *Phalaenopsis* HIBRIDA

NUR AFLAMARA

Phalaenopsis merupakan satu genus anggrek (anggota famili Orchidaceae) yang sangat populer dan sangat menjanjikan dari segi bisnis, pangsa pasar maupun nilai ekonominya, sehingga memberi peluang yang baik bagi pelaku usaha untuk mengembangkan usaha anggrek. Dihasilkannya *Phalaenopsis* hibrida unggul baru melalui pemuliaan tanaman secara terus-menerus merupakan salah satu kunci keberhasilan usaha peranggrecan nasional, karena selera konsumen yang selalu berubah. Salah satu kendala yang sering dihadapi oleh para penganggrec di Indonesia adalah lemahnya penguasaan teknologi pengecambahan biji, pembesaran seedling dan aklimatisasi planlet. Penelitian ini terdiri dari tiga percobaan yang bertujuan untuk mempelajari pengecambahan biji, pertumbuhan seedling *in vitro*, serta aklimatisasi dan pertumbuhan planlet anggrek *Phalaenopsis* hibrida. Pelaksanaan penelitian ini diawali dengan pemilihan tanaman induk, persilangan dialel lengkap dua tetua *Phalaenopsis* hibrida, yaitu (*Phalaenopsis* berbunga pink muda dengan labelum merah tua x *Phalaenopsis* berbunga ungu matang dengan labelum merah tua) dilanjutkan dengan pemeliharaan tanaman induk hingga polong buah masak hijau. Polong buah berbiji digunakan sebagai bahan untuk percobaan pengecambahan biji dan seedling dari hasil pertumbuhan protokorm digunakan untuk bahan percobaan pertumbuhan seedling *in vitro*. Planlet *Phalaenopsis* hibrida dari nursery digunakan untuk percobaan aklimatisasi planlet. Semua aktivitas penelitian tersebut dilaksanakan di Laboratorium Ilmu Tanaman mulai dari April 2014 hingga Juni 2015.

Ketiga percobaan dilaksanakan menggunakan rancangan acak lengkap (RAL) yang perlakuannya disusun secara faktorial (2x3). Setiap kombinasi perlakuan diulang tiga kali. Data hasil pengamatan dianalisis ragam dan jika terdapat perbedaan antar perlakuan dilakukan pemisahan nilai tengah dengan uji beda nyata terkecil (BNT) pada taraf nyata 5%. Percobaan 1 bertujuan untuk mempelajari pengaruh media dasar (MS atau Growmore biru 2,5 g/l) dan penambahan kinetin (0, 0,5, 1,0) terhadap pengecambahan biji dan pertumbuhan protokorm *Phalaenopsis* hibrida *in vitro*. Setelah 2 bulan sejak biji disemai dilakukan pengamatan banyaknya biji yang berkecambah dengan cara memberi skor pada rentang 1 (biji yang berkecambah sedikit), 2 (biji yang berkecambah agak banyak), 3 (biji yang berkecambah banyak), hingga 4 (biji yang berkecambah sangat banyak). Pertumbuhan protokorm diukur dengan menghitung persentase protokorm yang sudah membentuk primordia daun, dan

bobot 100 protokorm. Percobaan II bertujuan untuk mempelajari pengaruh media dasar (MS atau Growmore biru 2,5 g/l) dan kinetin (0, 0,5, 1,0 mg/l) terhadap pertumbuhan *seedling Phalaenopsis* hibrida *in-vitro*. Tinggi tanaman, jumlah daun, jumlah tunas, jumlah akar, panjang akar, bobot segar akar, dan bobot segar tanaman diamati setelah 3 (tiga) bulan dikulturkan. Percobaan III bertujuan untuk mempelajari pengaruh media aklimatisasi (serutan kayu gergaji atau serat sabut kelapa) dan zat pengatur tumbuh benziladenin (BA) atau *gibberelic acid* (GA), masing-masing 30 mg/l terhadap keberhasilan aklimatisasi dan pertumbuhan planlet anggrek *Phalaenopsis* hibrida. Persentase keberhasilan aklimatisasi, jumlah, panjang, dan diameter daun, jumlah dan panjang akar, serta bobot segar planlet diamati pada umur empat bulan setelah planlet berada di kondisi *ex vitro*.

Hasil percobaan I menunjukkan bahwa pada umur dua bulan setelah biji disemai, banyaknya biji yang berkecambah secara signifikan dipengaruhi oleh media dasar, dan konsentrasi kinetin, namun tidak terdapat interaksi antar kedua faktor. Media Growmore biru 2,5 g/l menghasilkan biji berkecambah yang lebih banyak daripada media MS. Demikian juga, penambahan 1 mg/l kinetin meningkatkan banyaknya biji berkecambah, sedangkan penambahan 0,5 mg/l kinetin tidak berpengaruh. Walaupun demikian, untuk pertumbuhan protokorm, tanpa kinetin media MS lebih baik daripada media Growmore karena menghasilkan persentase protokorm yang sudah membentuk primordia daun dan bobot 100 protokorm tertinggi. Media Growmore yang ditambah dengan 0,5 atau 1 mg/l kinetin menghasilkan persen protokorm berprimordia daun cukup tinggi. Oleh karena itu, media Growmore + 1 mg/l kinetin dapat digunakan untuk penecambahan biji *Phalaenopsis* hibrida sebagai alternatif yang mudah dan murah untuk menggantikan media MS.

Hasil percobaan II menunjukkan bahwa setelah tiga bulan di dalam kultur *in vitro*, pertumbuhan *seedling Phalaenopsis* hibrida *in vitro* secara umum tidak dipengaruhi media dasar kecuali jumlah tunas dan panjang akar, dimana media Growmore menghasilkan jumlah tunas yang lebih banyak dan akar lebih panjang dibandingkan dengan media MS. Penambahan kinetin ke dalam media MS maupun Growmore maupun interaksi antar kedua faktor juga tidak berpengaruh terhadap semua variabel pertumbuhan *seedling* yang diamati.

Hasil percobaan III menunjukkan bahwa pada umur empat bulan sejak planlet dikeluarkan dari botol, baik jenis media, penambahan ZPT dan interaksi antara kedua tidak berpengaruh nyata terhadap persentase keberhasilan aklimatisasi, jumlah daun, panjang akar dan bobot segar planlet. Media serutan kayu gergaji maupun serat sabut kelapa, baik dengan maupun tanpa BA atau GA, semuanya dapat digunakan untuk aklimatisasi anggrek *Phalaenopsis* hibrida karena menghasilkan keberhasilan aklimatisasi 100%, namun media serutan kayu gergaji sedikit lebih baik daripada serat sabut kelapa karena menghasilkan diameter daun lebih tinggi.

Kata kunci: *Phalaenopsis* hibrida, media dasar, kinetin, penecambahan biji, *in vitro*, pertumbuhan *seedling*, aklimatisasi planlet, serutan kayu gergaji, serat sabut kelapa, BA, GA.

ABSTRACT

STUDY OF *IN VITRO* SEED GERMINATION, SEEDLING GROWTH AND PLANTLET ACCLIMATIZATION IN HYBRID *Phalaenopsis*

By

NUR AFLAMARA

Phalaenopsis is a worldwide popular genus in Orchidaceae which has an economically promising prospect due to its beauty and long lasting vase life. Continuous production of new hybrids of *Phalaenopsis* is needed to meet consumers' taste changes. Among the technical constraints which are experienced by orchid breeder in Indonesia are low seed germination and seedling growth, and variable success of plantlet acclimatization. This research consisted of three studies in the breeding activities of *Phalaenopsis*, namely: (1) Effects of basal media and kinetin concentrations on *in vitro* seed germination and protocorm growth; (2) Effects of basal media and kinetin concentrations on *in vitro* seedling growth; and (3) Effects of potting media and growth regulators application on survival and plantlet growth during acclimatization. Two of flowering hybrid *Phalaenopsis* plants (light pink petal with dark red labellum x purple petals with dark red labellum) were selected as parent plants for diallel mating to produce green mature seedpods which were subsequently used for the seed germination experiment. Seedlings resulted from the growing protocorms from the first experiment were used as plant materials in the second experiment. Parallel with the first and the second experiments, the acclimatization study was conducted using *Phalaenopsis* plantlets obtained from a nursery in Malang, East Java. All of the steps mention above were conducted in Plant Science Laboratory, Faculty of Agriculture, Lampung University, Indonesia since April 2014 to June 2015.

Each experiment was conducted using a completely randomized design with three replicates, namely : (1) Effects of basal medium (MS vs 2.5 g/l Growmore Compound Fertilizer, NPK 32:10:10) and kinetin concentrations (0, 0.5 and 1mg/l) on *in vitro Phalaneopsis* seed germination; (2) Effects of basal medium (MS vs 2.5 g/l Growmore compound Fertilizer, NPK 32:10:10) and kinetin concentrations (0, 0.5 and 1mg/l) on *in vitro* seedling growth; and (3) Effects of media (saw shredded woods vs coconut husk fibre) and application of growth regulators (30 mg/l benzyladenine (BA) or 30 mg/l of gibberelic acid (GA) on survival and growth of *Phalaenopsis* plantlets. Scoring of the amount of seed germinated, percent of protocorms with leaf primordia, and fresh weight of 100 protocorms were recorded at two months after seed sowing. In the study of seedling growth, length and width of leaves, number of leaves, number of roots,

length of longest roots and seedling fresh weight were recorded after the seedlings were three months in culture. In the study of plantlet acclimatization, plantlet survival, number of leaves, length and width of leaves, number and length of roots and plantlet fresh weights were recorded at four months after the placement of plantlets in *ex vitro* condition. All data were subjected to analysis of variance, if there be any significant difference among treatments, mean separations were calculated using least significant difference (LSD) at $\alpha=0.05$.

Results the first experiment showed that at two months after seed sowing, the amount of seed germinated was significantly affected by both basal media and addition of kinetin, but not the interaction between the two factors. Growmore medium resulted in much higher amount of seeds germinated than those in MS medium. Furthermore, addition of 1 mg/l kinetin also increased the amount of seeds germinated. However, for the growth of protocorms, which indicated by the proportion of protocorms with leaf primordia compared to globular ones and fresh weight of 100 protocorms, MS medium devoid kinetin was better than Growmore or other treatments assigned. Since the growth of protocorms produced by Growmore supplemented with 1 mg/l kinetin was still good for further growth, it was concluded that 2.5 g/l Growmore supplemented with 1 mg/l kinetin was the best medium for hybrid *Phalaenopsis* seed germination.

Results of the second study showed that after three months in culture, *Phalaenopsis* seedlings growth in general was not affected by basal media tested, with the exception that Growmore medium resulted in higher number of shoots and longer roots compared to MS medium. In addition, neither addition of kinetin in the medium nor interaction between the two factors influenced *Phalaenopsis* seedling growth, as shown by no significant difference in all variables observed. Therefore, it could be concluded that 2.5 g/l Growmore could be used as a good alternative to MS medium for *Phalaenopsis* seedling growth.

Results of the third study showed that after four months in *ex vitro* condition, neither the potting media (saw-shredded woods or coconut husk fibre) nor growth regulators added (BA or GA), nor the interaction between the two factors affected plantlet survival and plant growth as shown by no difference in the number of leaves, length of roots, and fresh weight of plantlets, with the exception that the saw-shredded woods produced more number of leaves compared to or coconut husk fibre. Therefore, both media tested, with or without application of BA or GA were suitable for *Phalaenopsis* plantlet acclimatization, since all treatments resulted in 100 % plantlet survival with almost the same growth.

Key Words: Hybrid *Phalaenopsis*, basal media, kinetin, *in vitro*, seed germination, seedling growth, plantlet acclimatization, saw-shredded woods, coconut husk fibre, benzyladenine, gibberelic acid.