Brian Amanda, 2018, **Analisis Model Matematika Penyebaran Penyakit Cacar Tupai pada Invasi Tupai Abu-Abu ke Tupai Merah**. Skripsi ini di bawah bimbingan Dr. Miswanto, M.Si dan Dr. Windarto, M.Si. Departemen Matematika, Fakultas Sains dan Teknologi, Universitas Airlangga, Surabaya.

ABSTRAK

Invasi tupai abu-abu ke tupai merah berdampak pada penyebaran penyakit cacar tupai. Virus cacar tupai tidak memiliki manifestasi klinis yang berarti ketupai abu-abu dikarenakan tupai abu-abu memiliki sistem kekebalan terhadap virus cacar tupai, sebaliknya virus cacar tupai pada tupai merah bersifat sangat mematikan karena tupai merah tidak memiliki sistem kekebalan terhadap virus cacar tupai. Pada skripsi ini, dibahas model matematika penyebaran penyakit cacar tupai pada invasi tupai abu-abu ke tupai merah. Berdasarkan analisis model, diperoleh tujuh titik setimbang yakni titik setimbang kepunahan E_0, titik setimbang non endemic tupai abu-abu dengan kepunahan tupai merah E_1, titik setimbang bebas non endemic tupai merah dengan kepunahan tupai abu-abu E_2, titik setimbang non endemic tupai abu-abu dan tupai merah E_3, titik setimbang endemik tupai abu-abu dengan kepunahan tupai merah E_4, titik setimbang endemik tupai merah dengan kepunahan tupai abu-abu E_5, dan titik setimbang endemik tupai abu-abu dan tupai merah E_6. Dengan menggunakan metode *Next Generation Matrix* (NGM) diperoleh bilangan reproduksi dasar R_o. Besaran ini menentukan eksistensi dan kestabilan titik setimbang model. Titik setimbang non endemik E_1, E_2, dan E_3 stabil asimtotis jika $R_0 < 1$, titik setimbang kepunahan E_0 serta titik setimbang endemik E_4 dan E_5stabil asimtotis dengan syarat tertentu, sedangkan titik setimbang E_6 cenderung stabil asimtotis dengan pendekatan bidang fase. Hasil simulasi numeric menunjukkan bahwa laju penyebaran penyakit cacar tupai berpengaruh terhadap pertumbuhan populasi tupai abu-abu dan tupai merah.

Kata Kunci: *Model matematika, Tupai, Cacar Tupai, Next Generation Matrix, Kestabilan*

Brian Amanda, 2018, **Mathematics Model Analysis of Squirrel Parapoxvirus Transmission in The Invasion of Grey Squirrel towards Red Squirrel.** This final project was supervised by Dr. Miswanto, M.Si and Dr. Windarto, M.Si. Mathematics Department, Faculty of Science and Technology, Airlangga University, Surabaya.

ABSTRACT

The invasion of grey squirrel towards red squirrel affects the transmission of squirrel parapoxvirus. The parapoxvirus does not have meaningful clinical manifestation to the grey squirrel's due to the grey squirrel's have immunity against the squirrel parapoxvirus. In contrast, the virus on red squirrel is deadly due to lack of immunity against the squirrel parapoxvirus. In this thesis, we analyze a mathematical model of squirrel parapoxvirus transmission in the invasion of grey squirrel towards red squirrel. From the model, we obtained seven equilibrium point, those are extinction equilibrium E_0, non-endemic equilibrium of grey squirrel with red squirrel extinction E_1, non-endemic equilibrium of red squirrel with grey squirrel extinction E_2, non-endemic equilibrium of grey squirrel and red squirrel E_3, endemic equilibrium of grey squirrel with red squirrel extinction E_4, endemic equilibrium of red squirrel with grey squirrel extinction E_5, and endemic equilibrium of grey squirrel and red squirrel E_6. By the Next Generation Matrix (NGM), we obtained basic reproduction ratio R_o. The magnitude of R_o will determine the existence and stability of equilibrium points of the model. Non-endemic equilibriums E_1, E_2 and E_3 are asymptotically stable if $R_0 < 1$, while extinction equilibrium E_0 and endemic equilibriums E_4 and E_5 are asymptotically stable under certain condition. The endemic equilibrium E_6 tends to conditionally asymptotically stable with phase plane method. The numerical simulation shows that the rate of squirrel parapoxvirus transmission affect population growth of grey squirrel and red squirrel.

Keywords : *Mathematics Model, Squirrel, Squirrel Parapoxvirus, Next Generation Matrix, Stability*