Simulation of fertility behavior of natural populations of rice at two environments using L-system

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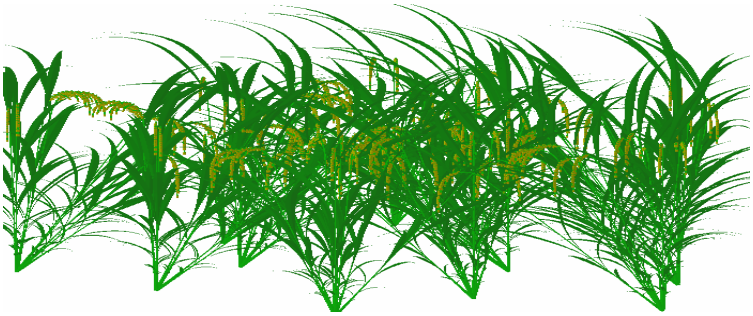
Introduction

In two populations of rice in Nepal: a bold grain variety, Taichung , and a long grain variety, P. Masino, the partial sterile panicles were collected from two different places in Bhaktapur, a hilly district. Parental or most prevalent genotype had 81.3% (with pink apiculus type hybrid swarm, Taichung type) and 82.9% (with brown apiculus type hybrid swarm, P. masino type) spikelet fertility. The partial sterile panicles were of two types: I →7.7-8.9% fertility and II→30% fertility. The relative frequencies of the sterile types varied from 1-2% per plot(≅100sq m) to even 50% per plot among different farmers' fields. A view of partial sterility is given below:

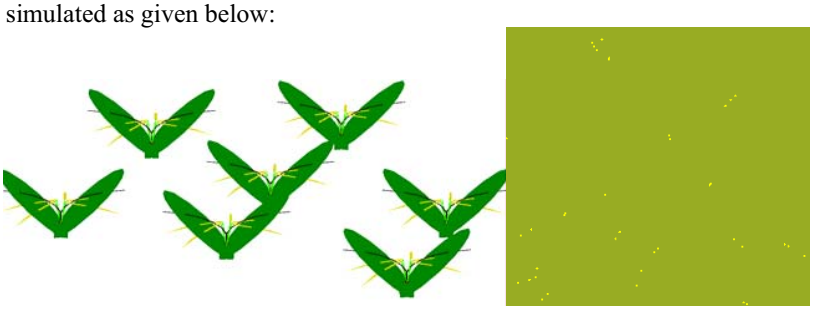
The distribution of spikelet fertility was trimodal. These data will be simulated considering 3 loci: A. B and C affecting fertility. Let α be frequency of fertile spikelets, N be the total number of spikelets, π_i be the effect of each loci and h_i be the out-crossing rate The expression can be written as $\alpha=\Theta(N,\pi,$ and h) based on Matsubara et. al.(2003) .

Simulation programs

Plant growth and development of rice field will be simulated through cpfg modified from Watanabe et. al. (2005), a visual output is provided below:



Similarly, flowering as affected by temperature and day length will be simulated. Pollination or pollen flow will also be simulated as given below:



Then the spikelet fertility as described previously will be simulated.

References:

K. Matsubara, Khin-Thidar and Y. Sano.2003. A gene block causing cross-incompatibility hidden in wild and cultivated rice. Genetics 165: 343–352

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