Assignment

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Question XL 63/2023

n a diploid angiosperm species, flower colour is regulated by the R gene. RR and Rr genotypes produce red flowers, whereas the rr genotype produces white flowers. If two individual plants are randomly selected from a large segregating population of a genetic cross between RR and rr parents, the probability of both the plants producing red flowers is

Solution:

Lets represent R as 1 and r as 0,

For the parent genes:

	1	1
0	10	10
0	10	10

TABLE I
GENE OF PARENTS.

Hence, we can see that it gives only Rr gene i.e.,10

For the children genes:

	1	0
1	11	10
0	10	00

TABLE II
GENE OF CHILDREN.

RV	Values	Description
X	0	11
	1	10
	2	00

TABLE III
RANDOM VARIBALE DECLARATION

parameter	value
n	2
p	$\frac{1}{2}$
q	$\frac{1}{2}$

TABLE IV
BINOMIAL PARAMETERS DECLARATION

$$p_X(k) = {}^nC_k p^k q^{n-k} \qquad \forall k = 0, 1, 2 \tag{1}$$

$$= {}^2C_k \left(\frac{1}{2}\right)^k \left(\frac{1}{2}\right)^{2-k} \tag{2}$$

$$= {}^2C_k \left(\frac{1}{2}\right)^2 \tag{3}$$

we know that Red flower comes for RR and Rr i.e.,11 and 10
Therefore,

$$\Pr(X \leq 1) = 1 - \Pr(X = 2) \tag{4}$$

$$= 1 - \frac{1}{4} \tag{5}$$

$$= \frac{3}{4} \tag{6}$$

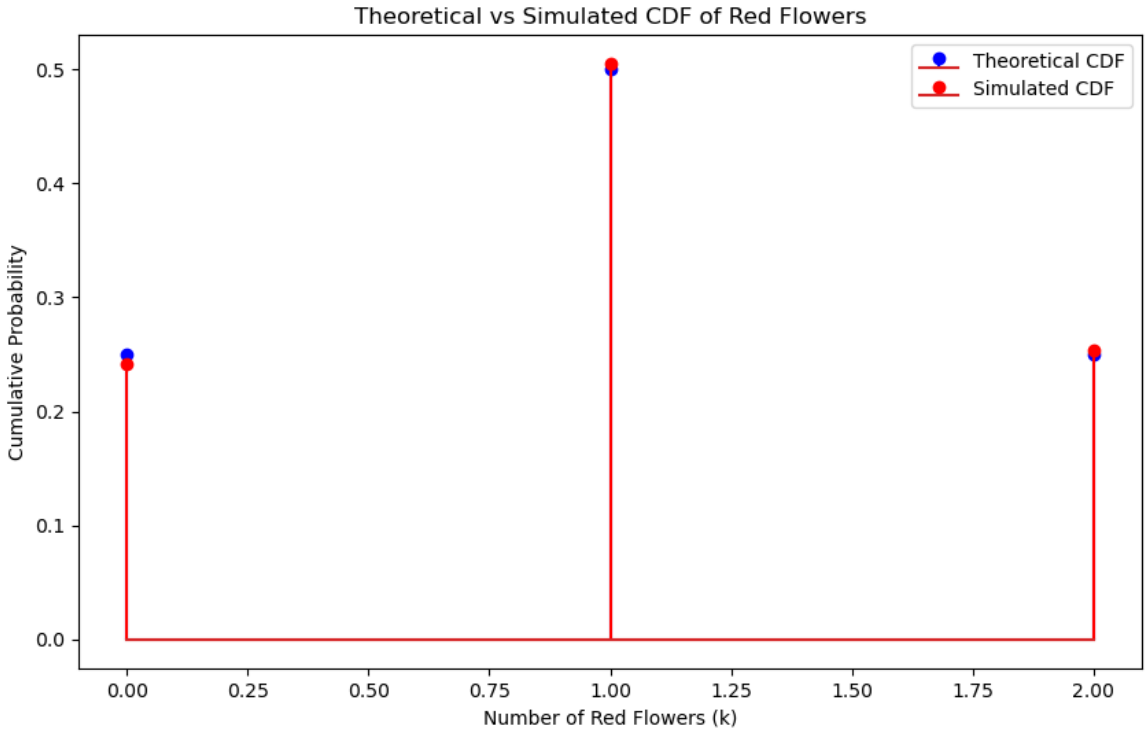

Fig. 1. Simulation vs Theoretical