Assignment

EE23010: Probability and Random Processes
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Question: A cytoplasmic male-sterile female plant with the restorer (nuclear) genotype *rr* is crossed to a male-fertile male plant with the genotype *RR*. Both *RR* and *Rr* can restore the fertility, whereas *rr* cannot. When an $F1$ female plant with *Rr* genotype was test-crossed to a male-fertile male plant with the *rr* genotype, the percentage of the population that is male fertile would be?

Solution:

Representing R and r as follows:

Gene	represent
R	1
r	0

TABLE 0
TABLE3: R=1,r=0

On crossing between 00 and 11 we get:

	1	1
0	10	10
0	10	10

TABLE 0
TABLE1: CROSSING BTW *RR* AND *rr*

Which gives F_1 as:

$$F_1 = \{10, 10, 10, 10\} \tag{1}$$

When F_1 (10) is test-crossed with (00) we get:

$$F_2 = \{10, 10, 00, 00\} \tag{2}$$

	0	0
1	10	10
0	00	00

TABLE 0
TABLE2: CROSSING BTW 10 AND 00

Probability that the population is male fertile(10) from (2)is given by:

$$\Pr(10) = \frac{1}{2} \tag{3}$$

$\therefore$ The percentage of the population that is male fertile would be 50%