

# 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  $F_1$  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:

$$F_1 = 10, 10, 10, 10 \quad (1)$$

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

$$F_2 = 10, 10, 00, 00 \quad (2)$$

	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:

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

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