Plant Genetic Engineering

Restriction Enzyme EcoRI

```
5' TTACGGGAGATTTCCTATTG 3'
3' AATGGCTCTTAAGGAGTAAC 5'
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EcoRI

```
5' TTACGGGAG ATTTCCTATTG 3'
3' AATGGCTCTTAAGGAGTAAC 5'
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DNA Ligase

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5' TTACGGGAGATTTCCTATTG 3'
3' AATGGCTCTTAAGGAGTAAC 5'
```

Blunt and cohesive ends generator

Four Restriction Enzymes

<table>
<thead>
<tr>
<th>Enzyme</th>
<th>Recognition site</th>
<th>Cleavage products</th>
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<tbody>
<tr>
<td>EcoRI</td>
<td>—AACTC—</td>
<td>—G AATTC—</td>
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<td></td>
<td>—CTTAA—</td>
<td>—CTTAA— G</td>
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<td>KpnI</td>
<td>—GCG—</td>
<td>—GG GC GG—</td>
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<td>—CCG—</td>
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<td>—AAGCTT—</td>
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<td>—TCGAA—</td>
<td>—TCGAA A—</td>
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<td>SmaI</td>
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<td>—GGGCCC—</td>
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</tbody>
</table>
**Agrobacterium tumefaciens, bacterium and disease**

**Taxonomic relationships:**
- Bacteria: Proteobacteria, Enterobacteriaceae, Rhizobiaceae
- Genus: Agrobacterium

- Bacterial hairy root transformation
- Rhizobial transformation
- Agrobacterium tumefaciens

**Disease symptoms:**
- Hairy roots
- Galls
- Wilt
- Reduced growth

**SEM of A. tumefaciens colonizing a sugar beet root**

**Identifying features of A. tumefaciens**

- Colonies on Agar medium
- Hairy roots
- Galls
- Reduced growth
Antisense Technology

Never ripe tomatoes