Identification and characterization of Blumeria graminis effectors is critical for obtaining a better understanding of barley powdery mildew interactions, which may contribute to new control strategies.

**Proteomics**

40 Blumeria effector candidate (BEC) genes

9 that appear to play a role in the host-pathogen interaction

**HIGS**

<table>
<thead>
<tr>
<th>BEC</th>
<th>Total GUS Cells</th>
<th>GUS Cells with Haustoria</th>
<th>Haustorial Index (Scaled)</th>
<th>Odds Ratio</th>
<th>Adjusted P-value</th>
<th>95% Confidence Interval of Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>pTA30</td>
<td>8052</td>
<td>802</td>
<td>100.00%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1011</td>
<td>1453</td>
<td>430</td>
<td>29.71%</td>
<td>0.3086</td>
<td>&lt;0.0001</td>
<td>0.1433 - 0.6646</td>
</tr>
<tr>
<td>1054</td>
<td>1785</td>
<td>73</td>
<td>41.06%</td>
<td>0.4172</td>
<td>&lt;0.0001</td>
<td>0.2286 - 0.7612</td>
</tr>
<tr>
<td>AVR1</td>
<td>3323</td>
<td>187</td>
<td>56.50%</td>
<td>0.5697</td>
<td>0.0002</td>
<td>0.3818 - 0.8500</td>
</tr>
<tr>
<td>1038</td>
<td>1651</td>
<td>21</td>
<td>56.11%</td>
<td>0.5785</td>
<td>0.0145</td>
<td>0.3523 - 0.9498</td>
</tr>
<tr>
<td>1016</td>
<td>1366</td>
<td>69</td>
<td>50.71%</td>
<td>0.5059</td>
<td>0.0151</td>
<td>0.2724 - 0.9397</td>
</tr>
<tr>
<td>1005</td>
<td>1294</td>
<td>63</td>
<td>48.88%</td>
<td>0.4921</td>
<td>0.0174</td>
<td>0.2566 - 0.9436</td>
</tr>
<tr>
<td>1019</td>
<td>1698</td>
<td>88</td>
<td>53.03%</td>
<td>0.5437</td>
<td>0.0184</td>
<td>0.3100 - 0.9536</td>
</tr>
<tr>
<td>1040</td>
<td>1979</td>
<td>115</td>
<td>58.34%</td>
<td>0.6054</td>
<td>0.0478</td>
<td>0.3672 - 0.9980</td>
</tr>
<tr>
<td>1018</td>
<td>1520</td>
<td>87</td>
<td>57.47%</td>
<td>0.5736</td>
<td>0.0568</td>
<td>0.3268 - 1.0064</td>
</tr>
</tbody>
</table>

**TTSS**

**VIGS**

Three replicates of each BEC 1019 silencing construct in HOR11358/Bgh 5874 resulted in noticeably less fungal growth as compared to BSMV:00 and Mock treated plants.

**BEC 1019 homologs highly conserved**

A total of 78 sequences with an E-value less than 1e-10 were returned representing 56 fungal genera from Ascomycota, Basidiomycota and Chytridiomycota.

The sequence shows similarity to Pra1 from Candida albicans and Major Allergen Asp F2. Eight conserved cysteines are predicted to form four disulfide bonds. HrXxH is highly conserved.

**Conclusions**

BEC 1019 may suppress defense and enhance virulence during the development of powdery mildew in barley.

**Acknowledgement**

We greatly appreciate the kind help of our colleagues from the Bogdanove, Wise and Spanu labs.