**Supplementary data for**

**Antimicrobial activity of *Pinus wallachiana* against *Fusarium oxysporum* f. sp. *cubense* and analysis of its fractions by HPLC**

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**Data Information**

**Supplementary tables, 11**

**Supplementary figures- 1**

**Supplementary Table S1: Completely randomized analysis of variance for percent inhibition of Focmycelial growth using four fractions of *P. wallachiana*, prepared from liquid-liquid fractionation. (*p*< 0.05)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **DF** | **SS** | **MS** | **F** | **P** |
| **Treatment** | 7 | 61937.7 | 8848.24 | 29886 | 0.0000 |
| **Error** | 32 | 9.5 | 0.30 |  |  |
| **Total** | 39 | 61947.2 |  |  |  |

Grand Mean 37.768 CV 1.44

**Supplementary Table S2: Pairwise Comparisons Test of Percent Inhibition for four fractions of *P. wallachiana* against Foc**

|  |  |  |
| --- | --- | --- |
| **Treatment** | **Mean** | **Homogeneous Groups** |
| 8 | 100.00 | A |
| 4 | 75.956 | B |
| 2 | 68.926 | C |
| 6 | 57.258 | D |
| 1 | 0.0000 | E |
| 3 | 0.0000 | E |
| 5 | 0.0000 | E |
| 7 | 0.0000 | E |

Alpha 0.05 Standard Error for Comparison 0.3441

Critical T Value 2.037 Critical Value for Comparison 0.7010

There are 5 groups (A, B, etc.) in which the means

are not significantly different from one another.

**Supplementary Table S3: Completely randomized analysis of variance for zone of inhibition produced by four different fractions of *P. wallachiana*against Foc. (*p*< 0.05)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **DF** | **SS** | **MS** | **F** | **P** |
| **Treatment** | 7 | 4925.78 | 703.682 | 440 | 0.0000 |
| **Error** | 32 | 51.20 | 1.600 |  |  |
| **Total** | 39 | 4976.97 |  |  |  |

Grand Mean 10.975 CV 11.53

 **Supplementary Table S4: Pairwise Comparisons Test of ZOI for four fractions of *P. wallachiana* against Foc**

|  |  |  |
| --- | --- | --- |
| **Treatment** | **Mean** | **Homogeneous Groups** |
| 8 | 24.400 | A |
| 4 | 23.800 | A |
| 2 | 21.000 | B |
| 6 | 18.600 | C |
| 1 | 0.0000 | D |
| 3 | 0.0000 | D |
| 5 | 0.0000 | D |
| 7 | 0.0000 | D |

Alpha 0.05 Standard Error for Comparison 0.8000

Critical T Value 2.037 Critical Value for Comparison 1.6295

There are 4 groups (A, B, etc.) in which the means

are not significantly different from one another.

**Supplementary Table S5: Completely randomized analysis of variance for 1st severity scoring of banana plants drenched with different fractions of *P. wallachiana* in green house experiment. (*p*< 0.05)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **DF** | **SS** | **MS** | **F** | **P** |
| **Treatment** | 14 | 73.962 | 5.28299 | 13.2 | 0.0000 |
| **Error** | 90 | 36.000 | 0.40000 |  |  |
| **Total** | 104 | 109.962 |  |  |  |

Grand Mean 3.6476 CV 17.34

**Supplementary Table S6: Pairwise Comparisons Test of 1st Severity Score for *P. wallachiana* fractions treatments used in green house experiment**

|  |  |  |
| --- | --- | --- |
| **Treatment** | **Mean** | **Homogeneous Groups** |
| 15 | 5.0000 | A |
| 13 | 4.5714 | AB |
| 14 | 4.4286 | AB |
| 1 | 4.2857 | BC |
| 3 | 4.2857 | BC |
| 7 | 4.2857 | BC |
| 10 | 4.0000 | BCD |
| 4 | 3.7143 | CDE |
| 9 | 3.5714 | DE |
| 2 | 3.4286 | DE |
| 12 | 3.2857 | EF |
| 11 | 2.7143 | FG |
| 6 | 2.5714 | G |
| 5 | 2.2857 | G |
| 8 | 2.2857 | G |

Alpha 0.05 Standard Error for Comparison 0.3381

Critical T Value 1.987 Critical Value for Comparison 0.6716

There are 7 groups (A, B, etc.) in which the means

are not significantly different from one another.

**Supplementary Table S7: Completely randomized analysis of variance for 2nd severity scoring of banana plants drenched with different fractionsof *P. wallachiana* in green house experiment. (*p*< 0.05)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **DF** | **SS** | **MS** | **F** | **P** |
| **Treatment** | 14 | 98.990 | 7.07075 | 20.6 | 0.0000 |
| **Error** | 90 | 30.857 | 0.34286 |  |  |
| **Total** | 104 | 129.848 |  |  |  |

Grand Mean 4.1048 CV 14.26

**Supplementary Table S8: Pairwise Comparisons Test of 2nd Severity Score for *P. wallachiana* fractions treatments used in green house experiment**

|  |  |  |
| --- | --- | --- |
| **Treatment** | **Mean** | **Homogeneous Groups** |
| 1 | 5.0000 | A |
| 3 | 5.0000 | A |
| 4 | 5.0000 | A |
| 7 | 5.0000 | A |
| 10 | 5.0000 | A |
| 13 | 5.0000 | A |
| 15 | 5.0000 | A |
| 14 | 4.5714 | AB |
| 2 | 4.0000 | BC |
| 9 | 3.7143 | CD |
| 12 | 3.2857 | DE |
| 11 | 3.0000 | EF |
| 8 | 2.8571 | EF |
| 6 | 2.5714 | F |
| 5 | 2.5714 | F |

Alpha 0.05 Standard Error for Comparison 0.3130

Critical T Value 1.987 Critical Value for Comparison 0.6218

There are 6 groups (A, B, etc.) in which the means

are not significantly different from one another.

**Supplementary Table S9: Completely randomized analysis of variance for 3rd severity scoring of banana plants drenched with different fractions of *P. wallachiana* in green house experiment. (*p*< 0.05)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **DF** | **SS** | **MS** | **F** | **P** |
| **Treatment** | 14 | 62.190 | 4.44218 | 8.91 | 0.0000 |
| **Error** | 90 | 44.857 | 0.49841 |  |  |
| **Total** | 104 | 107.048 |  |  |  |

Grand Mean 4.2381 CV 16.66

**Supplementary Table S10: Pairwise Comparisons Test of 3rd Severity Score for *P. wallachiana* fractions treatments used in green house experiment**

|  |  |  |
| --- | --- | --- |
| **Treatment** | **Mean** | **Homogeneous Groups** |
| 1 | 5.0000 | A |
| 3 | 5.0000 | A |
| 4 | 5.0000 | A |
| 7 | 5.0000 | A |
| 10 | 5.0000 | A |
| 13 | 5.0000 | A |
| 15 | 5.0000 | A |
| 14 | 4.2857 | AB |
| 2 | 3.8571 | B |
| 12 | 3.7143 | BC |
| 5 | 3.5714 | BC |
| 9 | 3.5714 | BC |
| 11 | 3.5714 | BC |
| 8 | 3.0000 | C |
| 6 | 3.0000 | C |

Alpha 0.05 Standard Error for Comparison 0.3774

Critical T Value 1.987 Critical Value for Comparison 0.7497

There are 3 groups (A, B, etc.) in which the means

are not significantly different from one another.

**Supplementary Table S11: Correlation coefficient and linear regression equation of each phenolic and flavanoid standards, at 285nm and 370nm, respectively.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Polyphenolic****Standards** | **Linear regression equation via area** | **Correlation coefficient****(R2)** | **Level of detection****LOD** | **Level of quantification****LOQ** |
| **Gallic acid** | y = 3550.6x+13254 | 0.9997 | 4.748764 | 14.39019 |
| **Catechin** | y = 755x+2181.7 | 0.9976 | 13.41135 | 40.64045 |
| **Epicatechin** | y = 1024x-3500.9 | 0.9969 | 15.15035 | 45.91015 |
| **Coumeric acid** | y = 9443.8x+18646 | 0.9992 | 7.548394 | 22.87392 |
| **Trans-Ferulic acid** | y =11042x-69020 | 0.9987 | 9.810637 | 29.7292 |
| **Rutin** | y = 4407.7x+21012 | 0.9994 | 6.476182 | 19.62479 |
| **Myrecitin** | y = 4417.6x+45057 | 0.999 | 8.343395 | 25.28301 |
| **Quercetin** | y = 13890x-47681 | 0.9998 | 3.710513 | 11.24398 |
| **Kaempferol** | y = 16883x-52784 | 0.9995 | 6.37866 | 19.32927 |



**Supplementary Fig. S1: HPLC chromatograms obtained for (a) n-hexane fraction at 285nm. 1=Gallic acid, 4=Coumeric acid, 5=trans-ferulic acid, (b) n-hexane fraction at 370 nm. 3=Quercitin, (c) Dichloromethane fraction at 285nm. 1= Gallic acid, 3=Epicatechin, 4=Coumeric acid, 5= trans-Ferulic acid, (d) Dichloromethane fraction at 370 nm. 3=Quercitin, 4= Kaempferol.**