

Exploring the Potential Biocontrol Isolates of *Trichoderma asperellum* for Management of Collar Rot Disease in Tomato

C. Shanmugaraj ¹, Deeba Kamil ^{1,*}, Aditi Kundu ², Praveen Kumar Singh ³, Amrita Das ¹, Zakir Hussain ⁴, Robin Gogoi ¹, P. R. Shashank ⁵, R. Gangaraj ¹ and M. Chaithra ¹

¹ Division of Plant Pathology, ICAR-Indian Agricultural Research Institute, New Delhi 110012, India

² Division of Agricultural Chemicals, ICAR-Indian Agricultural Research Institute, New Delhi 110012, India

³ Division of Centre for Protected Cultivation Technology (CPCT),
ICAR-Indian Agricultural Research Institute, New Delhi 110012, India

⁴ Division of Vegetable Science, ICAR-Indian Agricultural Research Institute, New Delhi 110012, India

⁵ Division of Entomology, ICAR-Indian Agricultural Research Institute, New Delhi 110012, India

* Correspondence: deebakamil@gmail.com (D.K.)

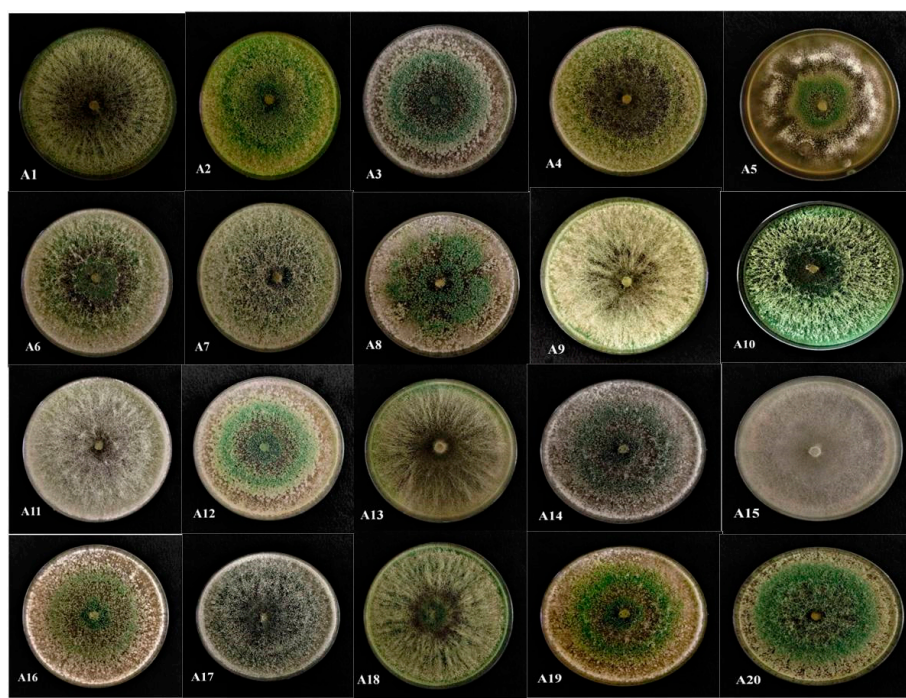


Figure S1: Growth characteristics of different isolates of *Trichoderma asperellum* on potato dextrose agar (PDA) after 7 days of incubation at 28±2 °C.

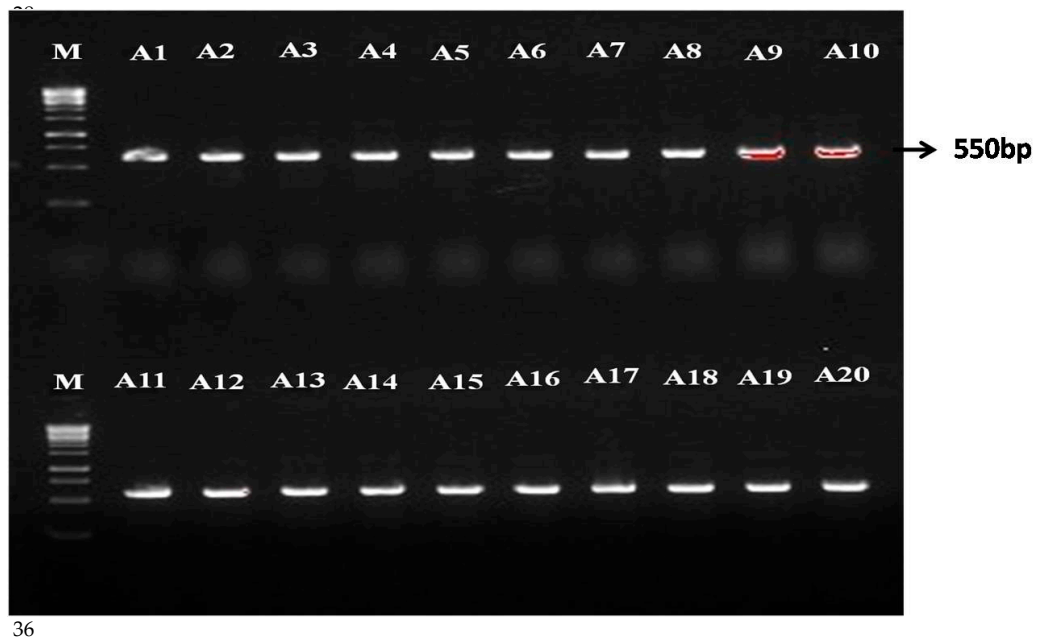


Figure S2: PCR amplification patterns in ITS1-5.8S-ITS2 with ITS1/ITS4 primers from twenty *Trichoderma asperellum* isolates; L is 1000-bp DNA ladder

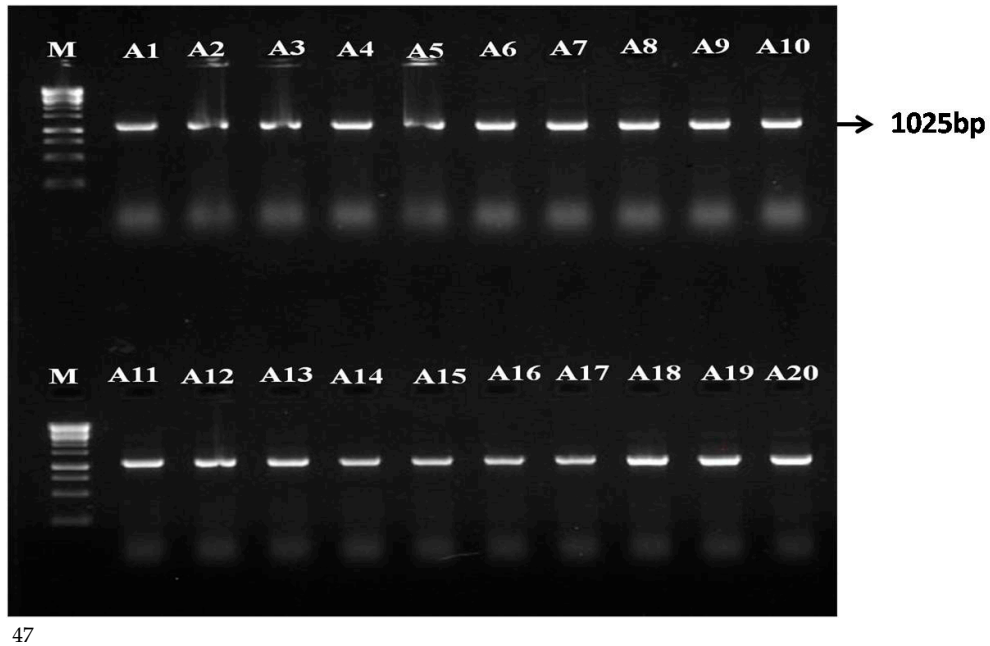
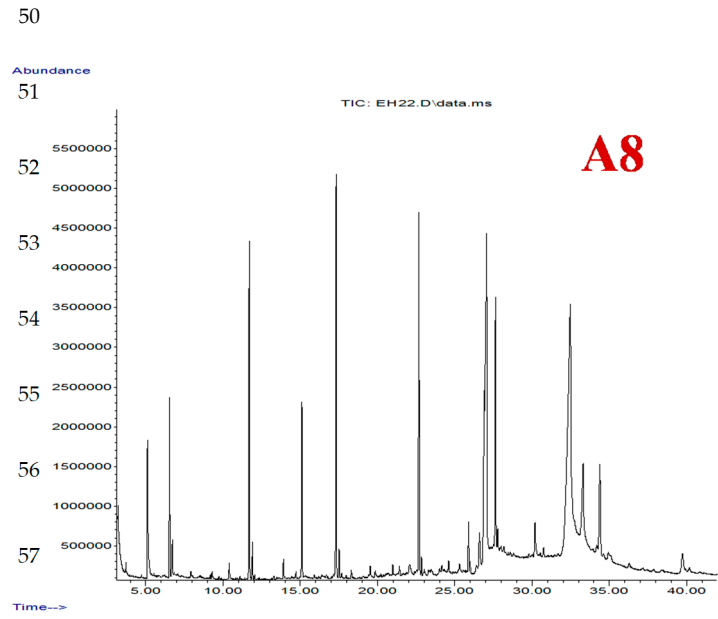


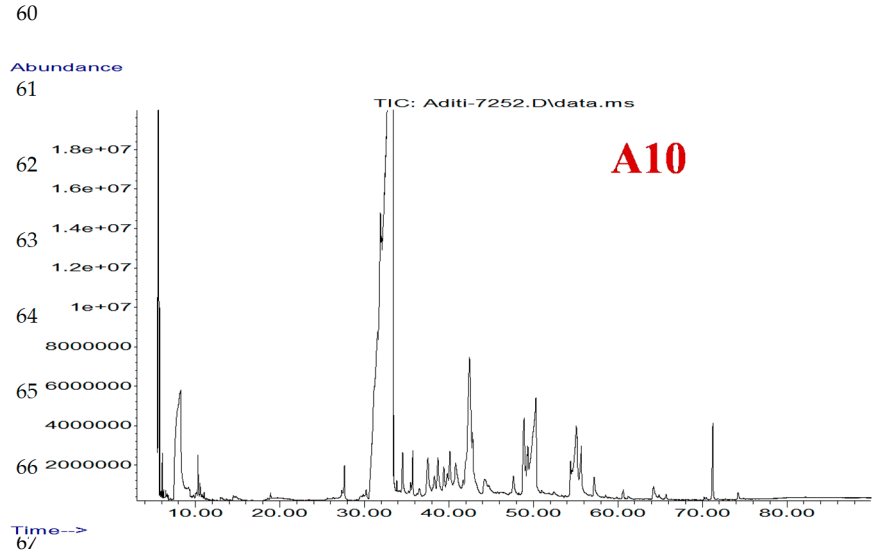
Figure S3: PCR amplification patterns in β -tubulin with B-tubf1-F / B-tubr1-R primers from twenty *Trichoderma asperellum* isolates; L is 1000-bp DNA ladder



58

Figure S4: GC-MS chromatogram of secondary metabolites from A8 isolate of *T. asperellum*

59



68

Figure S5: GC-MS chromatogram of secondary metabolites from A10 isolate of *T. asperellum*

69

70

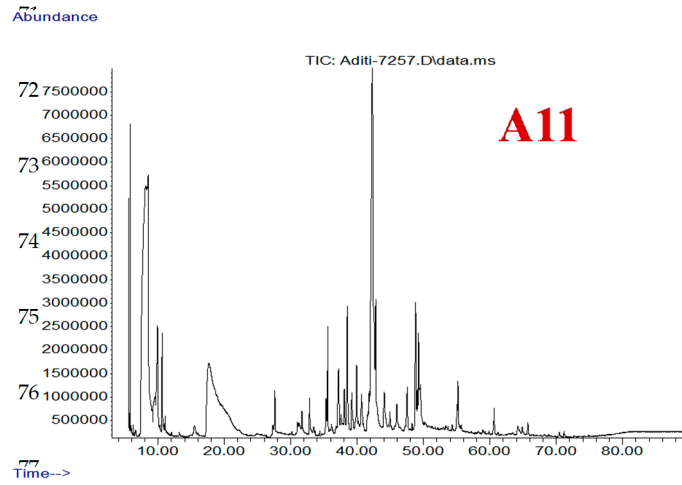


Figure S6: GC-MS chromatogram of secondary metabolites from A11 isolate of *T. asperellum*

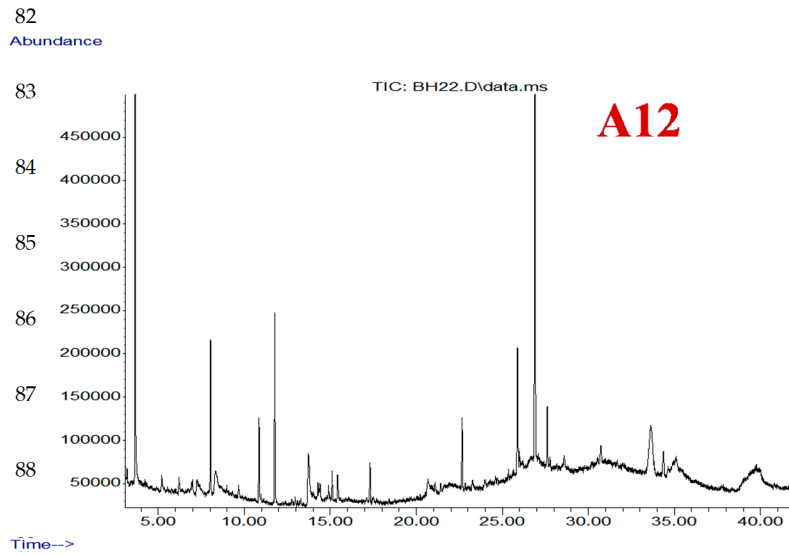
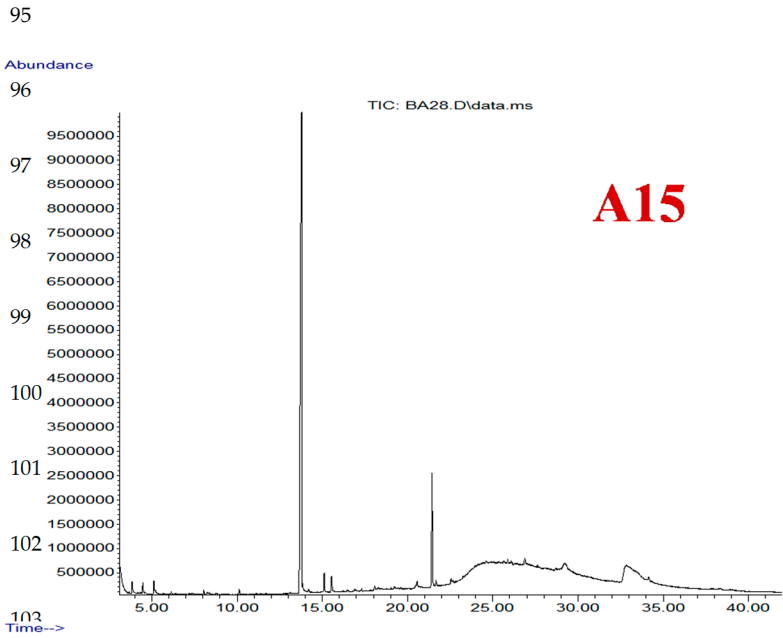


Figure S7: GC-MS chromatogram of secondary metabolites from A12 isolate of *T. asperellum*

94

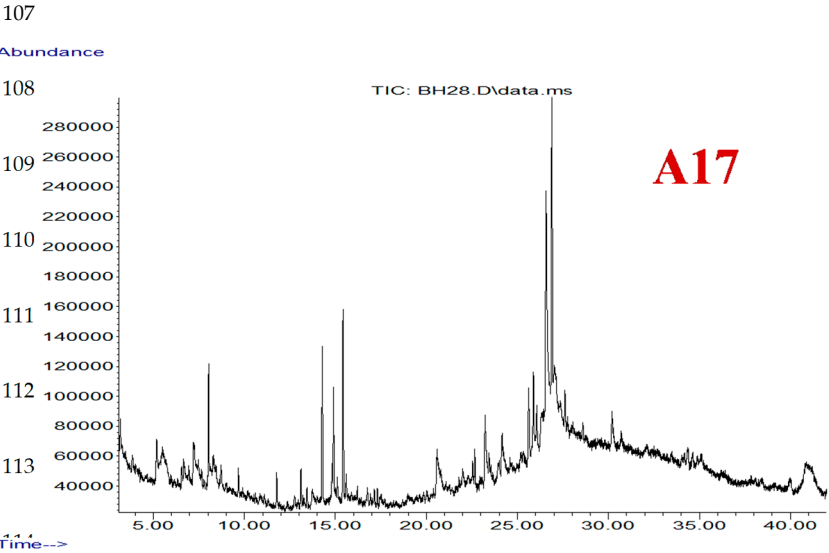


104

Figure S8: GC-MS chromatogram of secondary metabolites from A15 isolate of *T. asperellum*

105

106

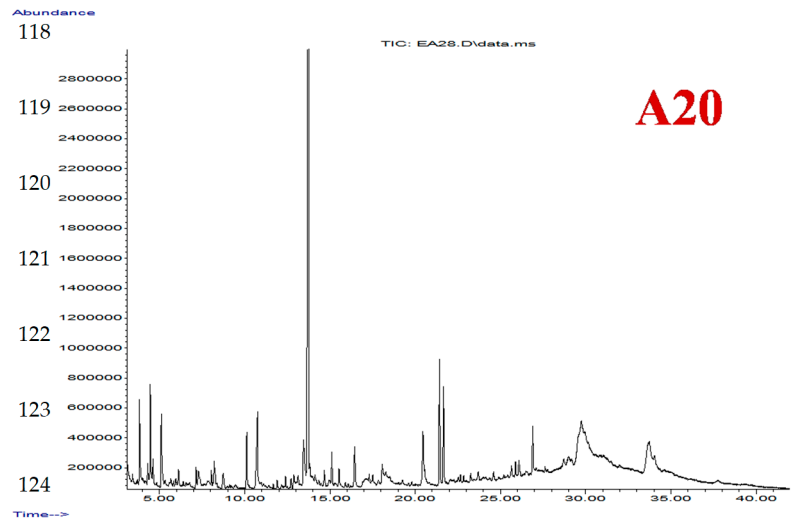


115

Figure S9: GC-MS chromatogram of secondary metabolites from A17 isolate of *T. asperellum*

116

117



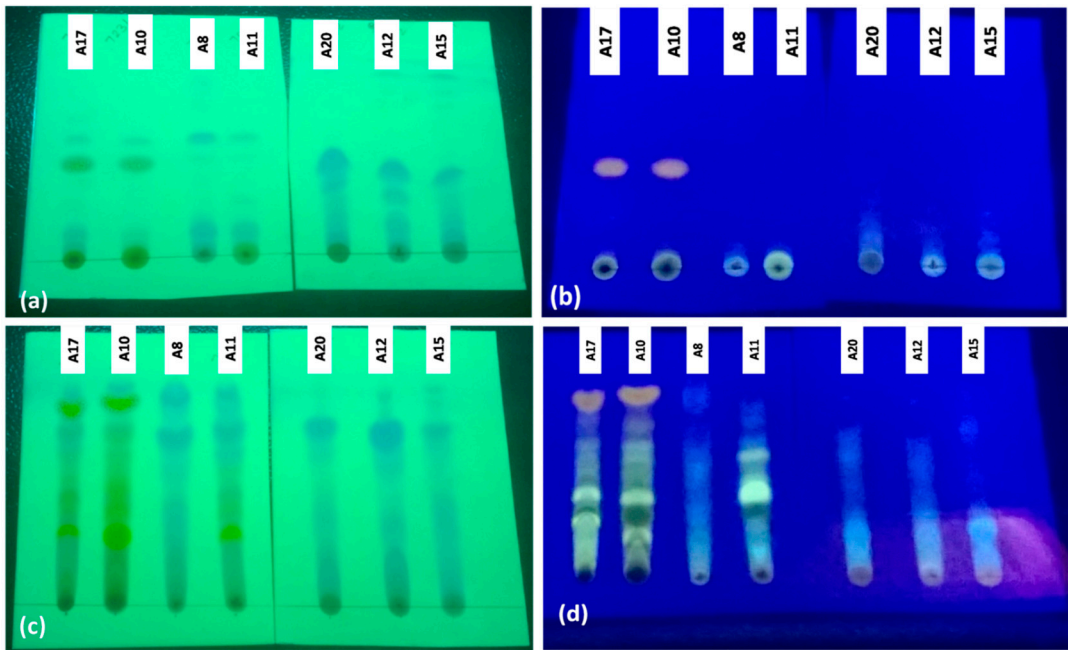
125

Figure S10 GC-MS chromatogram of secondary metabolites from A20 isolate of *T. asperellum*

126

127

128



137

Figure S11: TLC plates showing many spots of metabolites a) Long UV light range b) Short UV light range in the solvent system: Hexane: Ethyl acetate (9:1) c) Long UV light range d) Short UV light range in the solvent system: Hexane: Ethyl acetate (1:1)

138

139

140