survive/overwinter in citron melon seeds for at least 7 years and may serve as a local source of inoculum for FBF epidemic in the field.

Emergence and characterization of powdery mildew on hop cultivars with R6-based resistance E. ECK (1), S. Wolfenbarger (1), C. Ocamb (1), D. Gent (2) (1) Oregon State University, Corvallis, OR, U.S.A.; (2) USDA ARS, Oregon State University, Corvallis, OR, U.S.A. Phytopathology 103(Suppl. 2):S2.38

Podosphaera macularis, causal agent of powdery mildew on hop, is endemic to the hop growing areas of Oregon, Washington and Idaho. The disease reduces cone quality and can lead to crop rejection. Powdery mildew on hop is managed largely through fungicide application and major gene resistance. In summer 2011, powdery mildew was observed in two hop yards planted to cultivars highly deployed R6-based resistance. The purpose of this study was to characterize the spread and severity of powdery mildew on formerly resistant cultivars and virulent isolates of P. macularis. In 2012, 31 yards planted to cultivars possessing R6 were surveyed for powdery mildew. Incidence of powdery mildew varied among geographic regions in Washington, but was not observed in Oregon. Significant differences also were found in the incidence of powdery mildew among cultivars, suggesting that background resistance traits may affect susceptibility. Among 183 P. macularis isolates collected from Idaho, Oregon, and Washington, all were found to be of one mating type and no v6 isolates were recovered from non-R6 cultivars. Surveys will be repeated in the summer of 2013 and 2014 to more fully characterize the distribution of powdery mildew on cultivars with R6 and their susceptibility to the disease. Additional research is ongoing to assess fitness penalties associated with R6 virulence.

Importance of potato volunteers as a source of ‘Candidatus Liberibacter solanacearum’ in the Columbia Basin of Oregon and Washington J. E. EGGER (1), S. I. Rondon (1), A. F. Murphy (1), P. B. Hamm (1) (1) Oregon State University, Hermiston, OR, U.S.A. Phytopathology 103(Suppl. 2):S2.38

Zebra chip (ZC) disease caused by ‘C. Liberibacter solanacearum’ (Lso) was first reported in OR and WA in 2011. The importance of Lso infected potato volunteers as pathogen sources in OR and WA is undetermined. Potato cultivars Umatilla and Ranger fields heavily infected with ZC in 2011 were surveyed 11 May 2012 for symptomatic volunteers. Symptomatic plants were tested by PCR to confirm the presence of Lso. Of the tested symptomatic plants, 48.6% of the Ranger and 53.3% of the Umatilla were positive. The percent plants per acre that were both ZC symptomatic and Lso positive were 4% (Umatilla) and 7% (Ranger). To determine if seed tubers from Lso infected plants could be a source of the bacterium, naturally infected tubers from 6 potato cultivars were collected fall 2011, stored in potato storage facility and planted, with healthy seed (control), in a screen house in the spring of 2012. Symptomatic plants were tested for the presence of Lso. ZC incidence and severity in seed tubers was determined for each cultivar. Overall emergence was 53% for tubers from infected fields and 99% from healthy seed. Although plants emerged with Lso from symptomatic plants emerged faster, were smaller, and died earlier than asymptomatic and healthy controls. Although plants emerged with Lso from infected tubers, they are not likely to be a significant source of Lso in OR and WA due to mitigating factors.

Biocatalytic potential of endophytic fluorescent Pseudomonas isolated from Salvadora species S. EHTESHAMUL-HAQ (1), F. Korjo (1), V. Sultana (2), S. A. Ali (3), J. Ara (4), (1) Department of Botany, University of Karachi, Karachi, Pakistan; (2) Department of Biochemistry, University of Karachi, Karachi, Pakistan; (3) HEJ Research Institute of Chemistry, University of Karachi, Karachi, Pakistan; (4) Department of Food Science & Technology, University of Karachi, Karachi, Pakistan. Phytopathology 103(Suppl. 2):S2.38

The Salvadora species have a number of proven medicinal applications and almost all parts of this plant have pharmacological importance. Plants are able to tolerate dry environment and high soil salinity. In the present study 62 isolates of endophytic fluorescent Pseudomonas were isolated from roots, shoots and leaves of two species of Salvadora i.e. S. persica and S. oleoides. Most of these isolates were identified as P. aeruginosa. In vitro test several isolates showed strong antifungal activity against root rotting fungi Macrohomina phaseolina, Rhizoctonia solani, Fusarium solani and F. oxysporum. Cell free culture filtrates of these isolates also showed significant nematocidal activity by killing the 2nd stage juveniles of root knot nematode Meloidogyne javanica, at varying degrees. Application of potential isolates of P. aeruginosa as soil drench significantly prevented the attack of root rotting fungi and root knot nematode on mugunbean, sugarcan and cotton plants both in screen house and field experiments by reducing the fungal root infection and nematode’s penetration in roots. Endophytic fluorescent Pseudomonas also caused significant impact on plant growth and development of bigger and taller plants and healthy roots with increased in fresh shoot weight. Endophytic fluorescent Pseudomonas offer a non-chemical means of plant diseases control.

Mutations in the Potato leafroll virus non-structural protein p17 impair aphid transmission but do not affect virion assembly S. G. EID (1), A. R. Poplawsky (1), A. Karasev (1) (1) University of Idaho, Moscow, ID, U.S.A. Phytopathology 103(Suppl. 2):S2.38

Potato leafroll virus (PLRV) is a pleomorph-limit positive-strand RNA virus transmitted in a persistent manner (circulative, non-propagative) by aphids. A non-structural, p17 protein encoded by the ORF 4, contained within CP gene in a different reading frame, was previously identified as a host-dependent movement protein of PLRV. Twelve point mutations were generated in p17 without changing the overlapping CP amino acid sequence. These p17 mutant viruses were able to replicate and move systemically in Nicotiana benthamiana although they accumulated at different rates in systemically infected tissues. Efficiency of transmission of these PLRV-p17 mutant viruses from N. benthamiana to N. benthamiana by aphids was null or greatly impaired compared to the wild type PLRV. Virions purified from plants infected with these PLRV mutants were found to contain the same composition of structural proteins as the wild type PLRV. The p17 protein was not found in virions of the wild type PLRV and most of the mutants. The involvement of p17 in virus transmission, thus, occurs at other stages of PLRV life cycle, distinct from virion assembly.

Operational warning for Septoria leaf blotch and leaf rust in winter wheat: Importance of fungicide dosage, formulation, and spray time M. EL JARROUDI (1), L. Koudadi (2), M. Beyer (3), B. Tychon (4), P. Delfosse (3) (1) Université de Liège, Arlon, Belgium; (2) Agriculture and Agri-Food Canada, Leithbridge, AB, Canada; (3) Centre de Recherche Public, Gabriel Lippmann Département Environnement et Agro-Biotechnologies, Belvaux, Luxembourg; (4) Université de Liège, Campus Environnement Arlon, Arlon, Belgium. Phytopathology 103(Suppl. 2):S2.38

Field experiments were conducted in 2010 to investigate the effect of fungicide commercial formulation, timing and dosages on the severity of these two diseases in winter wheat in Luxembourg. Different types of fungicides and fungicide combinations containing active ingredients such as triazoles and strobilurins were used in field trials including susceptible cultivars to Septoria leaf blotch (SLB, caused by Septoria tritici) and winter leaf rust (WLR, caused by Puccinia triticina). The three formulations of fungicides tested were: (i) a mix of triazole and amino (Prothioconazole 250 g/l + Spiroxamine 500 g/l) and chlorothalonil 500 g/l, (ii) sole strobilurin (Azoxystrobin 250 g/l), and (iii) a mix of strobilurin and triazole (Epoxiconazole 125 g/l + Azoxystrobin 250 g/l). The optimum time of fungicide spray was assessed through the mechanistic model PROCULTURE and a stochastic model based on night favourable weather conditions conducive to WLR development. The results showed that for plots treated with fungicide formulation containing either a triazole or a strobilurin, the grain yield earned was not significantly different from the untreated plots (P > 0.05). Whereas single fungicide treatment involving a mixture of triazole and strobilurin at the optimum time gave an earning (on average 70 %) comparable to the control and a yield similar to that obtained with the double or triple fungicide treatments.

Profitability of using warning system for foliar disease of wheat in the Grand-Duchy of Luxembourg M. EL JARROUDI (1), L. Koudadi (2), M. Beyer (3), B. Tychon (4), P. Delfosse (3) (1) Université de Liège, Arlon, Belgium; (2) Agriculture and Agri-Food Canada, Leithbridge, AB, Canada; (3) Centre de Recherche Public, Gabriel Lippmann Département Environnement et Agro-Biotechnologies, Belvaux, Luxembourg; (4) Université de Liège, Campus Environnement Arlon, Arlon, Luxembourg Phytopathology 103(Suppl. 2):S2.38

Although small grain cereals (i.e. winter wheat) are routinely protected with two or three foliar treatments in the Grand-Duchy of Luxembourg (GDL), environmental concerns and changes in the cost-benefit ratio are likely to increase the demand for more accurate identification of spraying needs. A
Armillaria root disease in peach orchards of the state of Mexico, Mexico: Characterization of Armillaria species and assessment of disease impact

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Armillaria root disease is causing extensive mortality of peach (Prunus persica) trees within orchards in the State of Mexico, Mexico. Within 15 monitored orchards, average tree mortality was 9.7, 15.3, and 20.3% and disease-impacted area was 23.2, 24.7, and 28.3% during 2009, 2010, and 2011, respectively. Both rootstocks (cultivars of ‘Nemaguard’ and ‘Ciroillo de La Goleta’) used in the region were susceptible to the disease. Pathogenic Armillaria spp. were identified by DNA sequencing of two rDNA regions (partial 5.8S-ITS2-LSU D-domains and partial 3’ LSU-IGS1) and the translation elongation factor-1α (TEF) gene, accompanied by phylogenetic analyses. Analyses of 49 Armillaria isolates revealed that five isolates (10.2%) were A. mellica, eight isolates (16.3%) were A. gallica, and 36 isolates (73.5%) showed no close similarity to Armillaria sequences in GenBank, and apparently represent an undescribed Armillaria species. This undescribed Mexican Armillaria species is phylogenetically quite distinct from other North American Armillaria spp., and efforts are being devoted to describe this. The data presented in the manuscript account for over 50% of the isolates in the region, and identify Armillaria pathogens in peach orchards as a critical first step toward developing disease management practices, such as resistant rootstock.