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PROTECTING YIELD LOSS THROUGH MULTI-PATHOGEN RESISTANCE GENES: BENEFITS TO DURUM WHEAT?

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Productivity gains have been made in most crops using a combination of plant breeding and management practices. In order to meet the demands from projected growth in global population, estimates of more than 25% increase in production have been foreshadowed. A variety of strategies have been canvassed to meet this demand which includes protecting yield losses through effective disease resistance. With the re-emergence of stem rust in Sicily and a newly identified UK pathotype which later was classified as the Digalu race of Ethiopian origin, these recent rust threats coupled with other prevalent diseases serve as a timely reminder of the importance of ensuring adequate broad spectrum disease resistance in durum wheat. An ongoing challenge with breeding for yield is that it largely entails an integration of multiple traits. In hexaploid wheat, a small but intriguing class of novel resistance genes designated as *Lr34*, *Lr46* and *Lr67* have been identified that confer partial resistance in adult plants (APR) to all races of *Puccinia triticici*, *Puccinia graminis*, *Puccinia striiformis* and *Blumeria graminis* (rust and mildew). Their multi-pathogen resistance status makes them an appealing target for incorporating "backbone" traits that can facilitate development efforts towards more durable disease resistance breeding. While the multi-pathogen resistance genes, *Lr34* and *Lr67* can be transferred to durum wheats via induced homoeologous recombination, gene editing or transgenesis, *Lr46* however is present in durum wheats. Current observations across four continents point to variation in expression of *Lr46* in tetraploid wheats and can be exploited further to harness its combined effects with other genes to protect yield loss in commercial durum wheats.