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CHARACTERIZATION OF RESISTANCE TO ALL CHEMICAL CLASSES OF SITE-SPECIFIC FUNGICIDES REGISTERED FOR GRAY MOLD CONTROL ON STRAWBERRIES IN SPAIN

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Botrytis cinerea Pers., causal agent of the gray mold disease, is one of the most economically important fungal pathogens of strawberries worldwide. In Spain, as in other parts of the world, the main strategy for gray mold control involves the application of different classes of fungicides. To determine the fungicide resistance of the Spanish strawberry field population, 367 *B. cinerea* isolates were examined from 13 conventional and one organic strawberry field in Huelva (Spain) in 2014 and 2015. The sensitivities of these isolates to the six chemical classes of fungicides used for gray mold control in our country were examined using a spore germination assay with previously published discriminatory doses. The overall resistance frequencies were: for pyraclostrobin 74.6 %, boscalid 64.8 %, cyprodinil 37.0 %, fenhexamid 23.7 %, iprodione 14.7 %, and fludioxonil 0.8 %. Most strains (35.1%) were resistant to three different classes of fungicides. Between these isolates, the most prevalent resistance profile (55.8%) was resistance to pyraclostrobin, boscalid, and cyprodinil, followed by the resistance profile (30.2%) of pyraclostrobin, boscalid, and fenhexamid. One isolate was resistant to all six fungicides in 2015. Resistance to boscalid, fenhexamid, iprodione, and pyraclostrobin was caused by amino acid substitutions on target proteins, including H272R/Y in SdhB, F412I/S/V in Erg27, I365N/S in Bos1, and G143A in Cytb, respectively. Fludioxonil-resistant isolates were categorized as MDR1 or MDR1h dependent on sensitivity to cycloheximide, cyprodinil, fludioxonil, and tolnaftate. Our results justify the implementation of a resistance-monitoring program to help Spanish strawberry growers determine location-specific resistance profiles, identify weaknesses in their spray programs and to tailor spray sequences to farm-specific needs.

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