The authors reported to PGRSA in 2009 the modes of action and potential crop yield benefits of azoxystrobin and 1-methylcyclopropene (1-MCP), due primarily to plant physiological effects. This paper expands on the previous report by detailing recent findings related to crop enhancement benefits of azoxystrobin and 1-MCP. Azoxystrobin provides both disease-control related and physiological benefits leading to increased yield and harvestability including increased CO₂ assimilation, green leaf area, harvestability, grain-fill and stalk size & quality, aligned with reduced lodging and decreased seed bank for volunteer corn in the following season. Recent development activities related to the physiological impact of 1-MCP in corn, rice and cotton will also be discussed.