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Sommario/riassunto	<p>Environmental stresses and metabolic by-products can severely affect the integrity of genetic information by inducing DNA damage and impairing genome stability. As a consequence, plant growth and productivity are irreversibly compromised. To overcome genotoxic injury, plants have evolved complex strategies relying on a highly efficient repair machinery that responds to sophisticated damage perception/signaling networks. The DNA damage signaling network contains several key components: DNA damage sensors, signal transducers, mediators, and effectors. Most of these components are common to other eukaryotes but some features are unique to the plant kingdom. ATM and ATR are well-conserved members of PIKK family, which amplify and transduce signals to downstream effectors. ATM primarily responds to DNA double strand breaks while ATR responds to various forms of DNA damage. The signals from the activated transducer kinases are transmitted to the downstream cell-cycle regulators, such as CHK1, CHK2, and p53 in many eukaryotes. However, plants have no homologue of CHK1, CHK2 nor p53. The finding of Arabidopsis transcription factor SOG1 that seems functionally but not structurally similar to p53 suggests that plants have developed unique cell cycle regulation mechanism. The double strand break repair, recombination repair, postreplication repair, and lesion bypass, have been investigated in several plants. The DNA double strand break, a most critical damage for organisms are repaired</p>

non-homologous end joining (NHEJ) or homologous recombination (HR) pathway. Damage on template DNA makes replication stall, which is processed by translesion synthesis (TLS) or error-free postreplication repair (PPR) pathway. Deletion of the error-prone TLS polymerase reduces mutation frequencies, suggesting PPR maintains the stalled replication fork when TLS is not available. Unveiling the regulation networks among these multiple pathways would be the next challenge to be completed. Some intriguing issues have been disclosed such as the cross-talk between DNA repair, senescence and pathogen response and the involvement of non-coding RNAs in global genome stability. Several studies have highlighted the essential contribution of chromatin remodeling in DNA repair. DNA damage sensing, signaling and repair have been investigated in relation to environmental stresses, seed quality issues, mutation breeding in both model and crop plants and all these studies strengthen the idea that components of the plant response to genotoxic stress might represent tools to improve stress tolerance and field performance. This focus issue gives researchers the opportunity to gather and interact by providing Mini-Reviews, Commentaries, Opinions, Original Research and Method articles which describe the most recent advances and future perspectives in the field of DNA damage sensing, signaling and repair in plants. A comprehensive overview of the current progresses dealing with the genotoxic stress response in plants will be provided looking at cellular and molecular level with multidisciplinary approaches. This will hopefully bring together valuable information for both plant biotechnologists and breeders.
