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Fusarium Head Blight (FHB) is one of the most important fungal disease of wheat, reason of concern for both crop losses and production by *Fusarium* species of mycotoxins, toxic metabolites for human and animals. The main species causing FHB is *F. graminearum*, a type B trichothecenes (TCTB) producer. However, contamination by other mycotoxins is frequently reported, such as beauvericin (BEA), considered a global food concern. However, BEA, for its ionophoric properties, can enhance the efficacy of antifungal drugs. We evaluated the effect of BEA on *F. graminearum* growth and TCTB production and investigated the BEA potential enhancing effect on the efficacy of various drugs. *In vitro* experiments were carried out culturing the CBS 185.32 *F. graminearum* strain on liquid medium containing 0.2, 2 or 20 mg/l of BEA, alone or in mixture with a sub-lethal dose (1 mg/l) of Azoxystrobin (Azo), Difenoconazole (Dif) and Prothioconazole (Pro). After 5 days, all tested concentrations of BEA significantly inhibited fungal growth up to 32.8% on highest concentration. However, after 14 days no difference was observed respect to control condition. After 14 days, BEA slightly increased the antifungal effects of Azo, with inhibition values up to 40%. Highest inhibition was observed on medium containing 2 mg/l BEA and Dif (77%) and 0.2 or 2 mg/l of BEA and Pro (inhibition values of 43 and 67%, respectively). On the contrary, 20 mg/l of BEA reduced prothioconazole activity. Production of TCTB was not detected in presence of Azo alone or in mixture with BEA. *F. graminearum* produced TCTB when cultured on medium amended with Dif and Pro alone, while did not produced TCTB on medium amended with 2 and 20 mg/l of BEA + Dif and 0.2 and 2 mg/l of BEA + Pro. Highest dose of BEA + Pro induced *F. graminearum* to produce more TCTB than Pro alone. Altogether, our data indicate that BEA could modulate the effect of synthetic fungicides. Whole transcriptome analyses will elucidate molecular mechanisms underlying the response of *F. graminearum* to fungicides and BEA.