204-Goertz, A.

Bayer CropScience AG

Einfluss der Xpro® technology auf die Pflanzenphysiologie von Getreide

Plant physiological benefits of Xpro® technology on cereal crops

Xpro® is the technology behind a new family of cereal fungicides powered by the pyrazole carboxamide bixafen, a new SHDI, and prothioconazole, a well-established triazolinthione, both combined in the innovative Leafshield formulation system. Aviator Xpro® and Skyway® Xpro are representative products of the Xpro family which have recently been introduced in several European countries to control a broad spectrum of important fungal diseases including amongst others *Septoria tritici*, *Puccinia triticina*, *Pyrenophora tritici-repentis*, *Pyrenophora teres*, *Ramularia collo-cygni* and *Rhynchosporium secalis*.

In addition to their fungicidal activity, Xpro technologies have also beneficial effects on plant physiology. Wheat plants of the cultivar „Passat" cultivated in greenhouse under simulated drought stress conditions in the absence of disease, and sprayed with practical application rates of Xpro at flag leaf appearance (BBCH 39) are able to tolerate drought stress more effectively compared to untreated plants. Continuous non-destructive measurements of the leaf area of flag leaf and F-1 from BBCH 49 until late ripening demonstrated a delay in leaf shrinkage and rolling at later growth stages. Bigger leaves during grain fill are a positive character for higher yield potentials due to better light interception and greater photosynthetically active leaf area finally increasing assimilate production. Measurements of chlorophyll α fluorescence carried out with a HandyPEA-System (Hansatech Instruments, England) to determine the photosynthetic efficiency (Fv/Fm) on flag leaf and F-1 over the reproductive growth stages demonstrated that Xpro stabilizes the photosynthetic efficiency and activity of cereal crops. Differences in the photosynthetic efficiency between untreated droughted wheat plants and Xpro-treated plants were more pronounced at later growth stages, indicating accelerated leaf senescence in untreated plants. Differences in the photosynthetic efficiency between untreated and treated wheat was more pronounced on leaf F-1, which is most likely related to the earlier induction of senescence.

Observation of leaf surface temperatures by infrared thermography using a VarioCam® hr research (Infratech, Germany) disclosed in addition differences in the transpiration rate of untreated and Xpro-treated plants. The higher transpiration rate in treated plants implies cooler leaves and higher stomatal conductance, both aspects favoring net photosynthesis and crop duration (Araus et al., 2008).

Significantly higher numbers of harvested grains per ear indicated that an application of Xpro at flag leaf appearance even improves the stress tolerance during the growth period when the number of fertile florets = grains are determined. Although the number of grains per ear and thousand grains weights are in general negatively correlated, the grain yield of Xpro-treated wheat plants cultivated under drought stress was significantly higher compared to untreated, as the thousand kernel weight was not significantly impacted by the higher number of grains per ear.

The results demonstrate that under pathogen-free conditions, Xpro applied at flag leaf appearance, in addition, has beneficial effects on the reproductive growth stages of cereals improving their tolerance to drought stress. Beneficial plant physiological effects of Bixafen have already been reported by Berdugo et al. (2010, 2011). Further experimental studies are ongoing to elaborate the biochemical mechanism of Xpro leading to the improved abiotic stress tolerance.

Literatur

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205-Heger, M.; Strathmann, S.; Schiffer, H.; Cavell, P.; Menges, F.

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