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Biostimulant and Abiotic Plant Stress Interactions in Malting Barley: A Glasshouse Study

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Abstract : The European Green Deal announced in 2021 details agricultural chemical pesticide use and synthetic fertilizer application to be reduced by 50% and 20% by 2030. Increasing and maintaining expected yields under these ambitious goals has strained the agricultural sector. This intergovernmental plan has identified plant biostimulants as one potential input to facilitate this new phase of sustainable agriculture; these products are defined as microorganisms or substances that can stimulate soil and plant functioning to enhance crop nutrient use efficiency, quality and tolerance to abiotic stresses. Spring barley is Ireland's most widely sown tillage crop, and grain destined for malting commands the most significant market price. Heavy erratic rainfall is forecasted in Ireland's climate future, and barley is particularly susceptible to waterlogging. Recent findings suggest that plant receptivity to biostimulants may depend on the level of stress inflicted on crops to elicit an assisted plant response. In this study, three biostimulants of different genesis (seaweed, protein hydrolysate and bacteria) are applied to 'RGT Planet' malting barley fertilized at three different rates (0 kg/ha, 40 kg/ha, 75 kg/ha) of calcium ammonium nitrogen (27% N) under non-stressed and waterlogged conditions. This 4x3x2 factorial trial design was planted in a completed randomized block with one plant per experimental unit. Leaf gas exchange data and key agronomic and grain quality parameters were analyzed via ANOVA. No penalty on productivity was evident on plants receiving 40 kg/ha of N and bio stimulant compared to 75 kg/ha of N treatments. The main effects of nitrogen application and waterlogging provided the most significant variation in the dataset.

Keywords : biostimulant, Barley, malting, NUE, waterlogging
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