Response of lodging-related morphological traits of wheat to nitrogen fertilization and plant growth regulator

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Lodging, which refers to the falling over of the plant, negatively affects yield and quality in wheat. The present study investigated changes in lodging related morphological traits in response to nitrogen fertilization levels as well as treatment with plant growth regulator (PGR) that inhibits gibberellin (GA) biosynthesis in two wheat cultivars with contrasting plant heights. Our data shows that elevated nitrogen levels resulted in 21% to 24% increase in plant height, 2.6- to 3.0-fold increase in bending moment and 1.8- to 2.7-fold increase in lodging index in both cultivars. However, the cultivar with taller plant height exhibited higher bending moment and lodging index than the shorter cultivar. Furthermore, treatment of the taller cultivar plants with the PGR led to the reduction of plant height by 10% to 22% irrespective of nitrogen fertilization levels. This decrease in plant height was associated with a reduction in bending moment by 12% to 37%, which led to a decrease in lodging index by ~23%. Overall, lodging-related morphological traits are enhanced by nitrogen fertilization but repressed by treatment of plants with the PGR.