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Timing applications of growth regulators to alter spring cereal development at high latitudes

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## Abstract

Plant growth regulators (PGRs) are commonly used in commercial farming to control lodging in cereals. PGRs have been shown to affect tiller formation and plant stand structure, other than the straw length. To study their potential in Northern growing conditions PGRs application time impacts on plant stand structure and yield formation in tall and short statured cultivars of barley, oat, and wheat were studied in the field. Crop stands were sprayed with the gibberellin biosynthesis inhibitors CCC [chlormequat chloride CCC], Mepiquat [Trinexapac-ethyl TE], or with ethylene-releasing Cerone [ethephon ETH] at the recommended times or at an earlier growth stage. Zadoks growth scale (ZGS) 13-14 increased and ETH applied at ZGS 39-40 reduced grain yield of oat by 370 kg ha<sup>-1</sup> and 270 kg ha<sup>-1</sup>, respectively. In wheat, CCC applied at ZGS 31-32 reduced grain yield by 480 kg ha<sup>-1</sup>. This yield reduction was associated with lower yield production by the main head and particularly lower single grain weight. In barley cv. Kymppi, ETH and TE treatments promoted tiller formation, whereas in cv. Saana they tended to reduce yield. Early applied PGRs reduced stem height at 14 days after treatment in all species or stem stature, but at maturity no constant PGR effect was noted. Excluding the stem length, PGRs did not modify plant stand structure or yield formation markedly.

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