OPTIMIZING SHOOT AND ROOT GROWTH IN SMALL GRAINS WITH PLANT GROWTH RETARDANTS

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ABSTRACT

Several inhibitors of gibberellin biosynthesis [chlormequat chloride (CCC), mepiquat chloride (MQC), trinexapac-ethyl (TrixE), prohexadione-Ca (ProCa)] and the ethylene-releasing compound ethephon (ETH) are presently used in intense small grain production in Europe and some other countries. The main objective to apply these compounds is to reduce the risk of lodging, which may have a severe negative impact on seed yield and quality. Each of the compounds reduces shoot growth. However, some compounds act almost immediately (ETH and ProCa), TrixE requires several days for metabolic activation into its free acid form, and the onset of activity of CCC and MQC is also delayed. Likewise, there are significant differences in the duration of biological activity: ETH, ProCa are relatively short-lived, whereas CCC and MQC are more persistent. A well-developed root system is also important to counteract lodging. ETH, CCC (data not shown), MQC, and TrixE cause only a slight, if any, increase in root growth, whereas a significant stimulation is induced by ProCa (Fig. 1). Against this background, the recently introduced Medax® Top (50 g/l ProCa + 300 g/l MQC) is seen as an optimal combination to reduce the risk of lodging in small grains.

Fig. 1. Effects of ethephon, mepiquat chloride, trinexapac-ethyl, and prohexadione-Ca on shoot length (□), shoot dry matter (△), and root dry matter (●) in wheat seedlings.